JUNE 6, 1936

# ELECTRICAL WORLD

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## E.E.I. REPORT NUMBER

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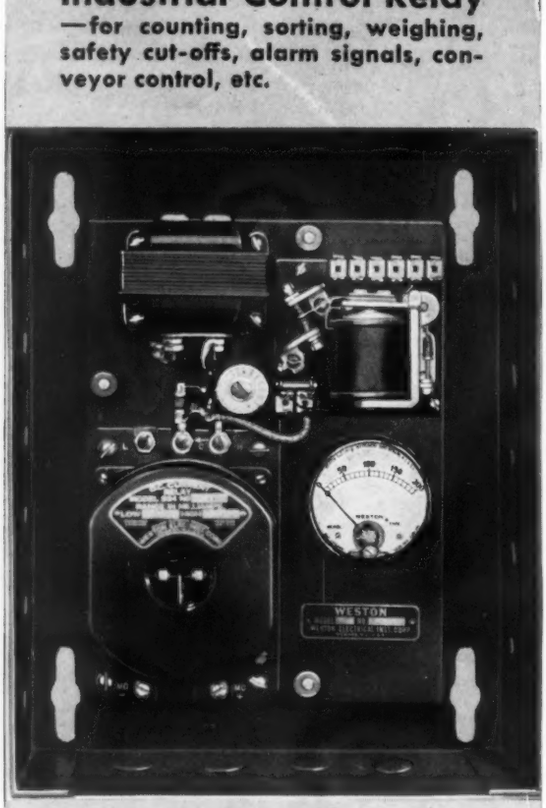

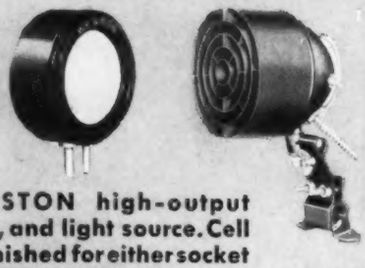

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# ELECTRICAL WORLD

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## EDISON ELECTRIC INSTITUTE NUMBER

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# LETTERS TO THE EDITOR

## *Questions Small Sample Conclusions*

*To the Editor of* ELECTRICAL WORLD:

In your April 11, 1936, issue, R. M. Winsborough presents a tabulation of data regarding kilowatt-hours used in two groups of refrigerators. One group is made up of refrigerators under three years old, while the second group consists of refrigerators more than three years old. Based on the data shown, the author concludes that it is reasonable to base estimates of consumption on the newer machines since they used, on the average, 1.6 kw.-hr. per day, whereas the older group show an average use of 2.1 kw.-hr. per day.

The data upon which these conclusions are based constitute small samples. The number of machines used was only thirteen in one sample and fourteen in the other. Using accepted methods for testing the difference between averages derived from small samples, the conclusion is reached that the difference shown might easily have been due to the sampling prooess. In other words, the authorities who have developed the methods for testing the reliability of small samples would argue that more data are needed before the difference in average consumption shown may be considered as a significant difference.

WILLIAM R. COWIE,
90 Broad St., New York.

•

## *About Dealer Selling*

*To the Editor of* ELECTRICAL WORLD:

I certainly got quite a kick out of the letter written by H. F. Shearer, manager of the Welland Hydro-Electric System, with reference to dealer sales of electric ranges, and I want to let you know that we greatly appreciate your editorial response to his letter. It is encouraging to know that the dealer has some friends in the electrical industry.

I am wondering what kind of a set-up Mr. Shearer has in his territory that should prompt his outburst against the dealers' ability. I would like to invite him to come to Minnesota and find out what really can be done when the utilities give the dealer a break that will permit him to merchandise on the same basis as that enjoyed by the utilities. We have several cities where the dealers unassisted have created a range saturation of from 20 to 50 per cent, and I believe that most of the utilities in this section of the country agree that the dealers are making a very valuable contribution to the industry by their efforts.

We have a group of electric range dealers in Minneapolis who are sponsoring on their own initiative a campaign consisting of 15-2,000-line advertisements which constitute one of the most outstanding campaigns ever carried on by a group of dealers anywhere in the country. It is my experience that dealers will generally meet their responsibility whenever they have the opportunity to do business on a basis that is comparable with the advantages enjoyed by most utilities. The dealer, however, must realize a satisfactory margin of profit on the original sale, because he has no opportunity for recurring revenue or profits on the same item after the original sale has been consummated.

I feel personally that utilities have made a valuable contribution in the promotion of major appliances and that promotional activities are a proper function of any utility. We can have very little objection to utility merchandising when it is carried on in a way that the dealers can meet fair competition.

The real answer to Mr. Shearer's letter, of course, is contained in the article on page 37 of the May 9 issue of ELECTRICAL WORLD, wherein it seems to be quite conclusively proved that the utility can gain load at less expense when there is some kind of a cooperative set-up in which the utility and the dealers join hands to promote sales. Records like this and others that are coming in this territory lead us to believe that any utilities which are not counting the dealers in on their plans are missing the biggest bet ever offered to them.

Again let us say we appreciate the fact that you are bringing such matters as this to the attention of the industry.

WILLIAM A. RITT,
Secretary-Manager
Minnesota Electrical Council.

•

## *Use of Electricity in Germany*

*To the Editor of* ELECTRICAL WORLD:

The ELECTRICAL WORLD of October 26, 1935, presents a summary on page 78 of the generation and consumption of electrical energy in Germany for the years 1932 and 1933. In the third paragraph a transposition of figures has obviously been made, resulting in misleading statements which we should like to correct.

Delivery of energy to industry is given as 130,000,000 kw.-hr. and energy for public lighting "two-thirds of the total output of 12,150,000,000 kw.-hr." The two figures should be interchanged. Industrial consumers took 8,070,000,000 kw.-hr., which is approximately two-thirds of 12,150,000,000 kw.-hr., while energy for public lighting consumed 130,000,000 kw.-hr.

REICHSVERBAND DER ELEKTRIZITATS-VERSORGUNG.
(National Association of Suppliers of Electricity.)

[ELECTRICAL WORLD is glad to call attention to this correction. After the article to which this letter refers had been published the Electrical Division of the Department of Commerce issued a revision of the data, correcting the transposition. —EDITORS.]

## *Advocates Four-Wire Feeders*

*To the Editor of* ELECTRICAL WORLD:

The subject "Lower Cost Wiring," page 32, ELECTRICAL WORLD, September 14, 1935, prompts me to offer some observations which I think will contribute to lower costs in many layouts, especially large installations. Briefly, it is to use four-wire, three-phase for feeders and sub-feeders on the customer's premises more extensively. While this type of circuit has been used widely for street mains, it seems to have been somewhat overlooked for sub-feeders. These observations are not in the same category with Mr. Damon's article nor with the mention made recently in connection with rural lines, but are a feeble effort to assist a bit in the sum total of electrical welfare. In the following mere mention is made of various installations, of which more details will be gladly furnished if desired.

List of examples to support recommendation for wider consideration of four-wire, three-phase:

Example 1—A sawmill building containing one 20-hp. motor, scores of various sized lights. All supplied from a bank of three 15-kw. transformers and feeders subdivided to the convenient load centers, from which point properly protected circuits radiated to the current-using devices. The load-distributing centers consisted in a connected group of externally operated fused switches in iron boxes, these boxes having space sufficient for necessary conduit and wire connection except in rare cases. In such instances a pull-box was supplied for conduit and wire connections.

Example 2—A company department store and office building supplied by a 75-kw. bank of transformers. This building contained a number of 3-kw. heaters, scores of lights, a 7½-hp. motor and a number of fans.

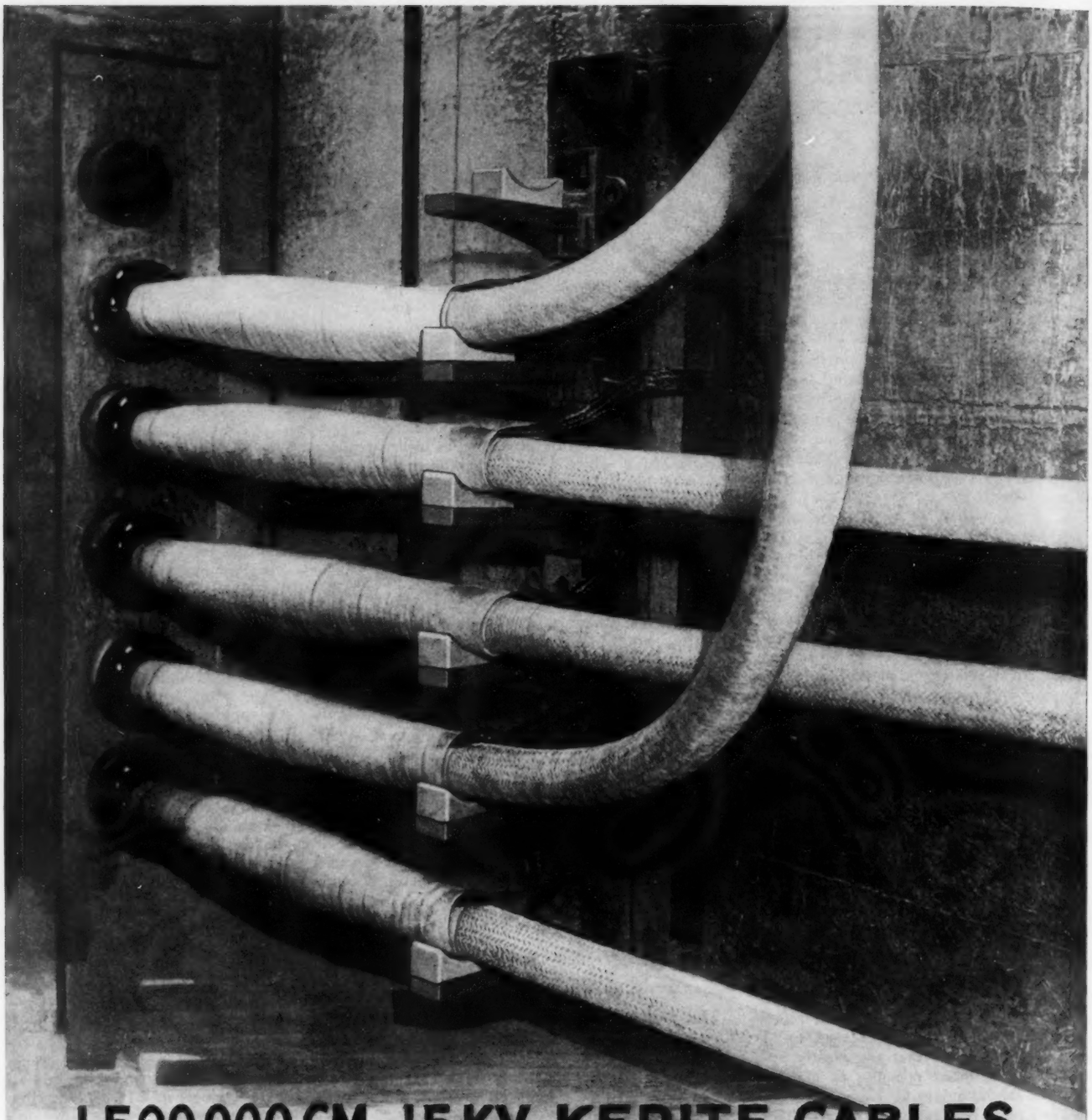
Example 3—A company hotel supplied from a 90-kw. transformer bank through one set of main feeders and two sets of sub-feeders to cabinets in load centers, from which radiated individual circuits to the following: More than a score and a half 3-kw. room heaters, numerous fans, lights and small appliances, two exhaust fans. By working the transformers at considerable overload a 15-kw. water heater by short intermittent use supplemented other means of water heating. All for more than five years' operation entirely satisfactory.

Example 4—A company hospital combined with doctor's residence requiring a 30-kw. transformer bank with load of necessary lights, water heater and a number of 3-kw. room heaters.

Example 5—One eight-room residence, two six-room residences, all separate cut-ins, but served with four-wire, three-phase, even into the kitchen range circuit fuse boxes.

To the experienced engineer the foregoing may seem elementary, but the object is to arouse more accurate comparison with other well-known types of feeder circuits.

FRED CLAYTON,
Nashville, Tenn.



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# *Our Industry Goes Ahead*

THE electrical industry should be refreshed and energized by the E.E.I. meeting in St. Louis. That convention had a quality and a spirit that made it stand out. Men on the firing line of the utilities were facing and overcoming handicaps. They were looking ahead to a new future with confidence and enthusiasm.

Papers on the program reflected this attitude. They were masterly discussions of current practices and policies in management, sales, engineering and accounting. No one can read these papers without gaining a knowledge that his industry is expert in its talent and that these experts are working toward a new record of accomplishment. Beyond the hard facts in the industry, the papers were luminous in attitude. They reflected an enthusiastic determination to do more, to go forward. The speakers met the challenge to the industry by showing knowledge, spirit and competency.

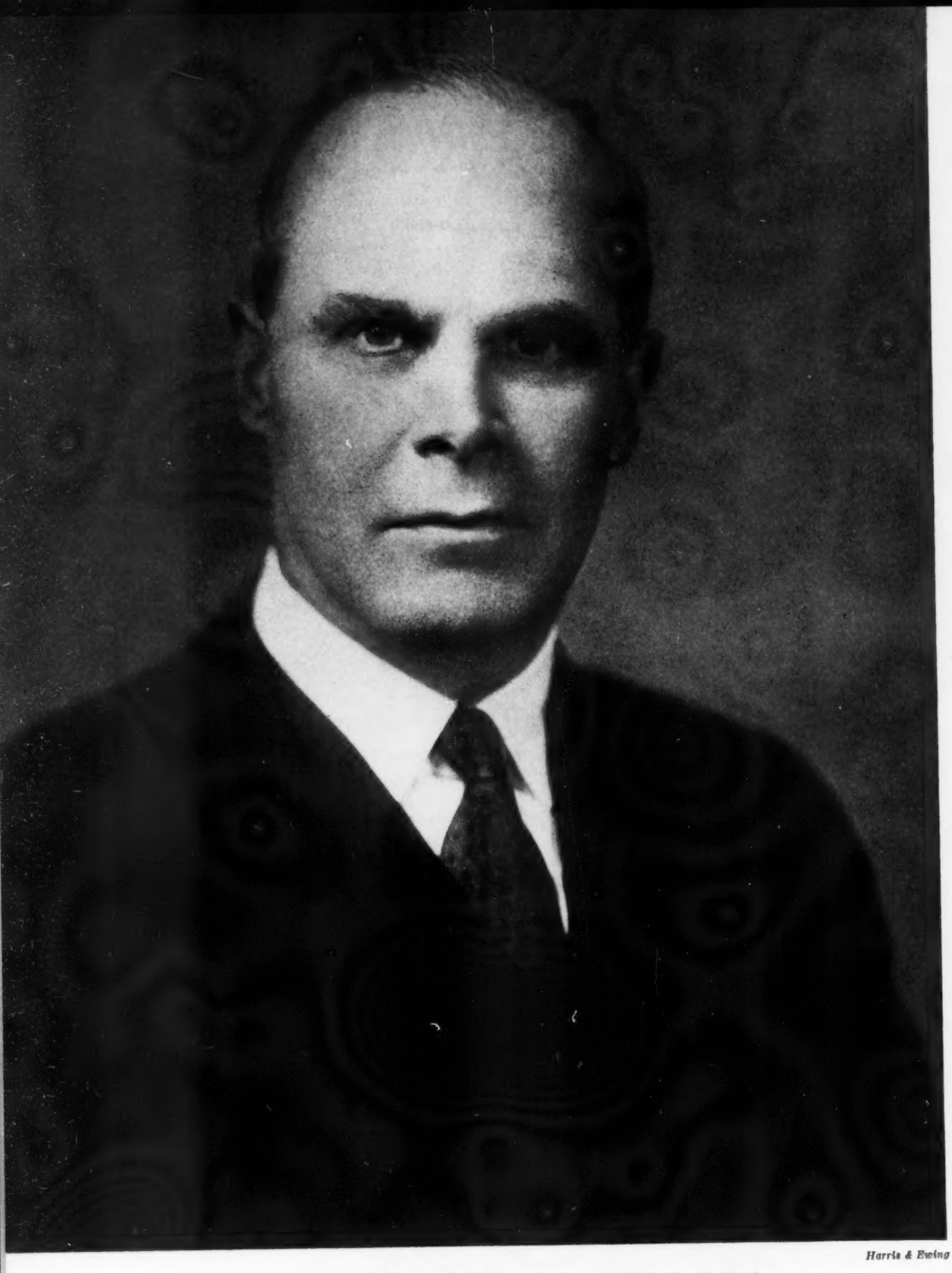
One had to be at the meeting to get the full flavor of the confidence and enthusiasm that permeated the thousands from all sections of the country. There was an atmosphere that created understanding, that seemed to bring out what to do and how to do it.

Plans for action were announced that should pull all electrical men together in a common cause. There is a drive on to go somewhere and the fighting spirit prevails. A busy time lies ahead and there is a whale of a job to do. Electrical men in attendance welcomed the tasks set before them, for they like to work and the doing of this work will bring security, good fortune and new records in electric service.

The 1936 convention stamped the E.E.I. as a needed and desirable agency. The undaunted and devoted leadership of Thomas N. McCarter and others has brought the organization to a stage that promises well for its future service. As a get-together and planning agency it is in action for the good of the industry. The week's meeting attests its merit and its value to electrical men. We hope all will read the following pages and partake of the feast set before them.

*Geo. T. Morrow*

Editor



*Harris & Ewing*

## CHARLES W. KELLOGG

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# Utility Talent Gathers in St. Louis

## Edison Institute Meeting Brings in 2,000 Leaders — Vigorous Refutation of Current Political Philosophies — Unanimity Marks Discussions on and off the Floor — Selling Again Sold as Salvation

STARTING with a curtain raiser consisting of a whole session devoted to accounting, rate and cost problems, the fourth annual convention of the Edison Electric Institute got under way Monday, June 1, in St. Louis with an attendance of several hundred that swelled rapidly during the day to more than two thousand. A cross-section of the program represents practically every major situation now confronting the electric utilities, with emphasis, as would be expected, on the troublesome conditions of government interference and competition. Attendance at such meetings as these imbues one with the feeling that here are earnest, honest and sincere men as may be met in every walk of life and that they cannot be the arch conspirators against the public weal as our friends in politics would make them out to be.

Certainly discussions on kitchen modernization, on developments in farm-line construction and farm wiring, on methods to attract business, on air conditioning and on many other technical and commercial problems supply no evidence in support of politically inspired charges of social misfeasance and criminality. Those items on the program dealing with such charges could never be characterized as anything more than the natural desire of men to protect from destruction the industry to which many of them have given their lives.

### Costs, Rates, Accounting Engross First Session

THREE raps of President Thomas N. McCarter's gavel at 2:30 p.m. last Monday and the words "the convention will be in order" opened the fourth annual E.E.I. convention at St. Louis. The low base rate of the host company drew first place in President McCarter's remarks and he then commented upon the convenient location from a national angle and hoped that in future, at least once in three years, the convention be held in the central area of the United States or further west.

"Mr. President, ladies and gentlemen," said Mr. Egan, "there are two very delightful things about a welcoming address. First, the listeners understand in advance what the speaker is to say, and, secondly, they hope he will make it short and snappy. This is the third time E.E.I., or its predecessor, N.E.L.A., has met in St. Louis. I dug up the proceedings of the original convention and read the local president's speech of welcome. It was not very long, but was very much to the point. He regretted only that no entertainment had been provided for the gentlemen. I would say, try Anheuser Busch this year, gentlemen, and you will have complete entertainment. The convention of 1910 was similar to that of today. The speakers dealt with the same subjects. Alex Dow expressed the philosophy of rates as it is expressed today. I can remember that H. L. Doherty closed his eyes and dreamed of the scope of electric heating. Most of what he dreamed came true.

To me it seems that these condi-

tions constitute great hope here for young men."

### *Gibson treats service cost*

Norman R. Gibson, speaking on the cost of electric service, stressed customer density and customer use as important factors in the cost of service. The customer virtually rents a portion of the generating transmission and distribution system, so that the customer and the company enjoy a sort of landlord-tenant relationship, said the speaker. Public service companies must meet constant competition of substitutes for the service, he pointed out, as, for example, an electric water heating rate of 1½ cents per kilowatt-hour is equivalent to $1.50 artificial gas, 540 B.t.u. and to coal at $38 per ton. Cost of capital and the taxes therefor for facilities may be of more weight than operating expenses as such in a cost analysis. Here was implied perhaps a new approach to matters of basic cost in rate studies. The old style company with an existing plant, serving only the lighting load and meeting its fixed charges, could afford to go out for power business at a competitive and therefore attractive rate. Railroad energy was priced on the same principles, said Mr. Gibson. In a selected community, if lighting alone was served, the average rate would have to be 9.6 cents, with street lighting at 5 cents, municipal water pumping at 2.75 cents and industrial service at 2.2 cents. However, a residential rate of 5.5 cents became possible.

### *No ABC formula for rates*

No arbitrary rule, therefore, can be made for determining what a rate shall be, said Mr. Gibson. "Cost of service to any one class of consumer is a will of the wisp and there are as many costs as there are theorists trying to find the answer." Mr. Gibson joined the growing list of men who are calling attention to the fallacy that increased usage varies directly with rate reductions. Three months to three years may be required to restore revenues. In some Ontario Hydro-Electric territory certain customers have never used more than 80 kw.-hr. per month, he said. Gas competition limited purchasing power of consumers. Presence or absence of general competitive services are all factors which transcend the influence of rate levels. This is true too of the residential load development program, according to Mr. Gibson.

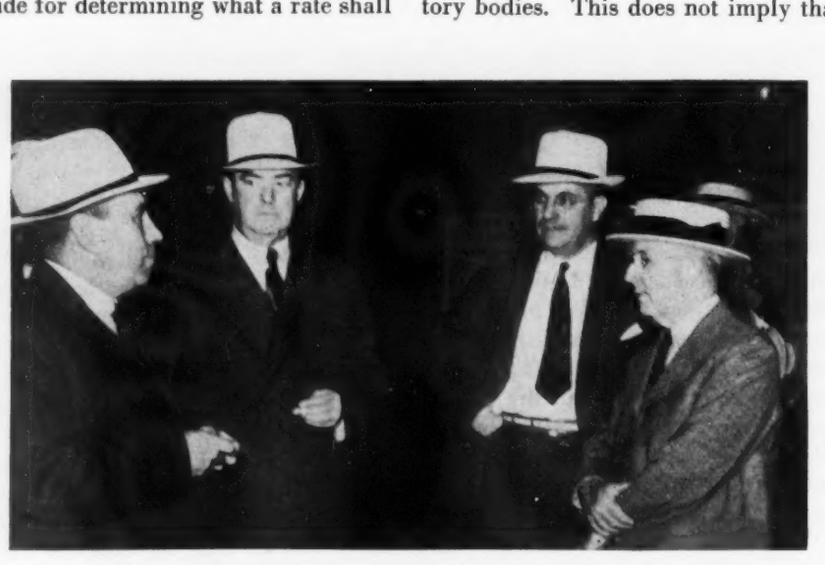
The Brookings Institute chart on incomes of U. S. families for 1929 was compared to the use of electricity and showed in striking fashion how kilowatt-hour usage increased along the same curve as the distribution curve for incomes. In other words, the more income the more kilowatt-hours and the two distribution curves were almost identical.

Speaking on the subject of rate reductions, W. G. Vincent cited world famous figures who have paid tribute to the genius and effectiveness of American enterprise, particularly in making adequate power service available to the masses. An average reduction in electric rates of about 2 per cent per year has taken place since 1910, said the speaker. Rates were reduced, he said, to get business, and the competitive situation exercised fully as much influence as did regulatory bodies. This does not imply that regulation is not necessary, for it is a form of checks and balances, which is the essence of our government. Electric rates are fixed, in short, by economic laws, and to deny this is to controvert the history of the industry, was Mr. Vincent's thesis.

### *Critical trend in accounting*

"The attitude of the Federal Trade Commission makes the following symposium of accounting of great interest at this time," said President McCarter in introducing "the dean of American accounting experts, whom we all know and respect, L. R. Nash." Utility accounting is different, said Mr. Nash, due to the predominating influence of fixed capital accounts and the tendency to impose restricted definitions on capital account items. Accounting records do not attempt to establish value, which is a result of judgment based on all of the conditions affecting the asset item. Uniform systems of accounts were developed over a period of sixteen years by the industry through N.E.L.A., and the latest was approved in 1932, Mr. Nash continued. The initiative devolved largely upon the utilities. The latest efforts of certain national regulatory bodies have not been leavened by the co-operative efforts offered by the utility companies. Management, investors and regulatory bodies all are interested in accounting records. Growth of property, new capital funds, proper reserves, rate forms and rate changes call for continuous, careful scrutiny of accounting records, Mr. Nash asserted. Management needs are most exacting and, therefore, systems which would meet the requirements of management should be entirely suitable for regulatory bodies, and of course for investors who own the property and wish periodic reports. Refinements in accounting should be dictated by the use of them actually made by the company, said Mr. Nash, and monthly detail records and reports, for example, should not be kept for information required only once in five years and which then may be developed from subsidiary records.

Less than one-fifth of all retirements are due to physical causes, he continued. The preponderant cause of past retirements has been inadequacy. Obsolescence may be of lessened effect in years to come, yet non-physical causes of retirement are so important and uncertain as to introduce errors of 50 per cent, so that extreme judgment



**Ira L. Craig and W. H. Taylor, Philadelphia Electric; W. P. Cochran, Westinghouse, Philadelphia; H. H. Ganser, Philadelphia Electric**

Julius Daniels, Boston Edison

is necessary in reflecting these future charges. Straightline depreciation was termed "at war with realities" in the Illinois Bell Telephone case, and Mr. Nash added that this terminology was drawn upon in the recent St. Joseph stock yard decision, repeating that value as such is not attempted to be established by fixed capital accounts. Mr. Nash spoke of the way, for example, that superposition may greatly enhance the value of a steam-driven unit quite independently of figures for the unit as shown on the ledgers. He also showed that rate bases cannot be completed by arbitrary deductions of depreciation or retirement reserve balances from fixed capital totals. In a convincing summary of all of the major facts developed from the years of experience of utility company executives Mr. Nash clearly described the reasons why methods of charging retirements of accumulating retirement reserves and extraordinary reserve requirements can best be left to management and no efforts should be made to impose arbitrary rules which do not reflect actual conditions.

H. L. Gruehn called attention to Mr. Nash's statement that the task of the accountant is to present facts in simple, understandable and usable form. The unsound principle now advanced outside the industry called the theory of original cost might better be called aboriginal cost, said Mr. Gruehn. Doubts would be cast upon 80 to 90 per cent of total fixed assets and the resulting items under the aboriginal cost theory would be misstated. Not only would there be a theoretical segregation of fixed assets which would be meaningless of itself, but new theories of retirement would be made retroactively and calculated upon an unsound theory, while many of the principles attacked by Mr. Gruehn were condemned by the New York Appellate Court two weeks ago (ELECTRICAL WORLD, June 30, page 4). The audience found the same facility of expression in Mr. Gruehn's talk that was indicated in advance by its unusual title. Cost to the accounting company cannot be determined under the theory of aboriginal cost, the speaker claimed, and he asked for some sound thinking on fundamental principles applying to value, to depreciation and to reserves.

Mr. Kohlhepp was absent from the session. President McCarter said Mr. Swinney was requested to postpone his paper until Tuesday and H. B. Gear terminated the day's program with his paper on continuing inventories.

## Utility Citizenship, Social Responsibility Attested

GREETINGS from the American Gas Association were read as President McCarter opened the Tuesday sessions. Walter F. Mallory then spoke about the campaign designed to bring about national recognition of the debt owed to the genius of Thomas Alva Edison. The plan of the foundation, involving living memorials or selected young men and women who would benefit from a scholarship plan, was said by Mr. Mallory to be a thought closely in accord with Mr. Edison's own lifelong interests. He had many times during his own personal career demonstrated his deep interest in American youth and its proper development. Mr. Mallory then related a series of anecdotes of Mr. Edison's personal character which threw additional light upon the human attributes and the supreme confidence ingrained in the wizard of Menlo Park.

President McCarter's address dealt first with the assaults of government upon the industry through the workings of the Wheeler-Rayburn bill. After reviewing the various legal actions now pending before courts of the nation, Mr. McCarter stated that he believed that advice of institute counsel holding the bill to be unconstitutional would result in the Supreme Court throwing the Wheeler-Rayburn bill out on the same scrap heap as it has thrown ten other New Deal bills. That the peak of the fight has been passed is the feeling of the president, although the industry cannot afford to be overconfident. As an example, Mr. McCarter read the statement issued Monday in Washington entitled "The Utility Issue in 1936," signed by almost one-third of the membership of the Senate and a much smaller proportion of the House. President McCarter then deplored the ever-increasing tendency of regulatory bodies to usurp the field of management. Latest example of this dangerous tendency, in the president's opinion, is the recent order of the I.C.C. requiring steam railroads to reduce fares up to 50 per cent.

The present efforts of the industry to fight off drastic, unnecessary and unsound changes in accounting, the national selling wave now sweeping across the industry, the uniquely complete information available to all about the public utility industry were among the many institute activities lauded by President McCarter.

Applause greeted the president's fine

J. F. Owens, Mrs. Jack Loveland, Jack Loveland, Miss Oma Lee Childress, Miss Eva Doty, all of Oklahoma Gas & Electric

tribute to employees of the industry, with particular reference to flood duties rendered by the all-important so-called rank and file in the companies, and it seemed as if there was a catch in his throat as he expressed in humble words the hope that the fruits of his rich experience may have been of some benefit to the public utility business. Protracted applause, which verged on a rising tribute, attested to the admiration, respect and affection of this industry won by Thomas N. McCarter.

George E. Whitwell, in his usual analytical and convincing manner, described the "ensemble selling" principles upon which the Kitchen Modernization Program is based. The present status of America's homes and kitchens, the rising tide of home-building construction and particularly the possibilities of electric kitchens in large-scale building developments were stressed by Mr. Whitwell in his efforts to sell his audience upon the desirability of this new load-building activity. A new kitchen planning manual available now at institute headquarters and a special commercial exhibit were only two of twoscore specific load-building helps described by the practical Mr. Whitwell and his matter-of-fact solutions of the industry's selling problems.

### *Utilities are good citizens*

The widespread tangible and invaluable contributions of a public utility company to the welfare of a great state were described by John F. Owens with a primary purpose of stressing to institute members the vital importance of disseminating facts about the industry to all the people. The report of this company's manifold social and economic contributions to the upbuilding of a state could well serve as a model for the construction of similar reports by other companies. A tribute to the industry's salesmen came from the speaker, due to the fact that they bring daily the story of the industry in tangible terms into the homes of the nation. The folks in the grass roots should be told in their own language the facts of the industry, and these facts should be wielded as weapons in the fight to keep this country the land of the free and the home of the brave, the speaker concluded.

As a man who has contributed unselfishly of his talents to the public utility industry, President McCarter was uniquely fitted to introduce Harper Sibley as a man who has unselfishly contributed of his talents to the welfare of all American business. Paying tribute to the material contributions of the industry to the welfare of the nation, Mr. Sibley named a few of the public utility people who have been active participants in the work of the United States chamber. The speaker's rapid delivery touched competently upon the American heritage of freedom of opportunity and then upon the industry's position in retaining for all business the right to manage its own private property, while the electric industry turns out to be the guinea pig in present governmental attacks. The rest of American business cannot blink at the fact that the utilities' fight is the fight of all business, the speaker said. He closed by quoting Alfred P. Sloan's statement in California last week stressing the responsibility of business leaders of America to supply the needs of America's citizens.

**C. S. McCain, United Light & Power, L. V. Sutton, Carolina Power & Light**

## Rural Program's Chances for Success

IN ITS program of rural electrification the federal government has blithely embarked on an experiment for which failure is indicated by all past experience in the field. It will be difficult even with the fairest promises to lure the farmer deeper into debt to pay for electricity. It has been proved possible by progress already made to effect definite reductions in costs of farm-line construction. New developments in building wiring methods and materials will reduce such costs if these methods and materials are applied. There four impressions of the rural electrification problem stand out from the third session of the convention, which included masterly discussions of the four inferred phases of the matetr by W. W. Freeman, Dr. E. A. White, A. E. Silver and E. A. Brand, respectively.

It was somewhat unfortunate that, obviously on account of the exigencies of program making, this session included also two other very excellent papers that would have had a better play for interest if they had not been followed so closely by such very able discussions of a very live subject. The first presented of these two was that by S. M. Dean on "Firm Ratings as a Guide to System Loadings and Design," a clear exposition of the urgent problems that today confront utility operating and design engineers. "How far may a given system be loaded without undue hazard to equipment or to the quality of service to which he has become accustomed" and "having used existing plant to the safe maximum, in what direction shall new developments be carried to insure that the cost per kilowatt of load-carrying capacity be a minimum consistent with acceptable service?" Were the two questions stated by Mr. Dean and answered by description of the application of the "firm rating" method in a specific case. Briefly, the method requires meticulous analysis of system loads in relation to equipment ratings to establish the reasonably safe overload capacity of equipment remaining in service when other equipment is inoperative from emergency causes.

### *Hazards in refinancing at low rates*

Most significant in the second of these two papers, that by C. W. Kellogg on "Present-Day Financing for Public Utilities" was the statement that of the more than one-and-a-half-billion dollars of utility bonds sold in the past fourteen months actually less than 1 per cent represented new capital, the rest being entirely for refunding. Contrast this with the fact that in the eight years from 1923 to 1930, inclusive, the industry expanded at a rate that required $830,000,000 of new capital each year. No more striking evidence of the paralysis of utility construction has ever been presented to thinking people. It is also provocative of very serious thought to note the later remark by Mr. Kellogg to the effect that savings secured by refunding will very probably be canceled out by lowered earnings allowed by regulatory com-

missions or eaten up by easily foreseen increased tax demands.

The session was opened by Floyd L. Carlisle with an exhortation to the utilities to participate in and support the world power conference next fall. Mr. Carlisle said that the conference had been invited in 1930 to hold its next meeting in this country and that it had certainly not been staged to coincide with a national election campaign, and that he had been assured that it would not be given a political character.

### *Farm income thwarts grandiose program*

Present farm income does not measure up to the opportunity of rural electrification, said Dr. E. A. White, in the first of the four farm service papers. Dr. White also stated that the American farmer is inclined and is perfectly able to manage his own affairs, and that efforts to patronize, reform or educate him are less needed than a determination of the parts of both government and business serve him intelligently in their respective functions. Wiring alone will probably run to a hundred dollars or more for the minimum-use farm customer, said E. A. Brand, and to be reasonably sure that such customers do get adequate wiring jobs it is distinctly up to the utilities to see that newly developed more economical materials are used and that recent liberalizations in the National Electrical Code be fully comprehended and enjoyed. In the planning of an engineering and sales procedure for the area development of rural service A. E. Silver listed quality of service, reliability of construction, safety, simplicity, right-of-way, co-ordition with communication circuits, voltage regulation, conductors, spans, transformers, equipment protection, services and meters as the essential factors to be included. He discussed each of these in detail, explaining their application in the rural service practices of companies in the bond and share group.

Doubt that the government would ever get back any of the money put out in "self-liquidating" farm lines was certainly implied, if not expressed, by W. W. Freeman in his discussion of the relations of the electric utility industry with the Rural Electrification Administration. Mr. Freeman's paper is an exhaustive presentation of the rural electrification situation extending from the original order of President Roosevelt to today and covering testimony of Administrator Cooke at Congressional committee hearings on numerous phases of the program. Appended are a copy of the ten-year act recently passed and a considerable amount of tabulated data showing the accomplishment of the program to date. In this connection it is indeed interesting to note from the excerpts of his testimony that Mr. Cooke reported as of March 13 this year in regard to funds actually advanced that "it is a very small amount, a matter of, I should say, at most a couple of hundred thousand dollars."

## Air Conditioning and Sales Accounting

The fourth general session, held Wednesday afternoon, with Arthur H. Kehoe presiding, opened with W. H. Swinney speaking on merchandise accounting. The more important phases of Mr. Swinney's discussion revolved about true costs of merchandising sales, allocation of joint departmental expenses, interpreting the effects of load building on rural extensions and the lack of uniform methods followed by utilities in arriving at figures for "fair return income" or net operating income. Unnecessary accounting details are unduly expensive, said the speaker, and he hoped a Supreme Court decision would soon settle the question of whether public utility companies may properly merchandise appliances.

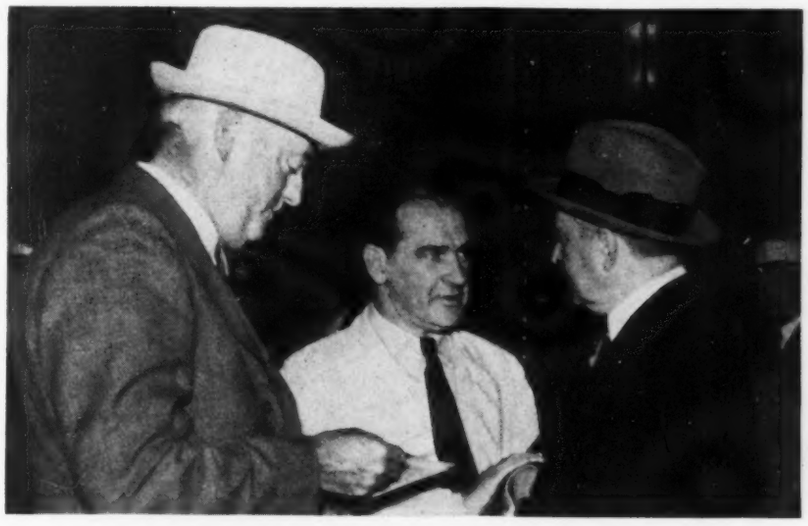
Dr. G. W. Allison opened his talk by citing his years of experience in sales work, and particularly the years he spent selling current-consuming devices in most of the states of the Union. "The consuming public," he said, "is a vital part of this industry. The consuming public is at one end of the industry and the generators at the other end of the industry."

Mr. Owen's talk was mentioned by the speaker as an excellent example of the form of facts which should be impressed upon the consuming public so that the industry may be better understood by it.

As for reasons why the consuming public does not understand the industry, Dr. Allison mentioned the mysterious nature of electric service and the method of total amount billing. Comparisons of cost and dramatization of the service were two steps which must be taken, he said, and national sales programs are the agency for effecting these steps. The National Co-operative Sales Program and the Better Light-Better Sight activity were mentioned as theme song activities which have created an improved public understanding of the entire industry and provided the way for the industry to sell itself out of trouble.

### *Destructive animus condemned*

"The campaign to destroy," by F. W. Post, was opened by almost the first humorous comment in the entire program so far. A very receptive audience, therefore, listened to Mr. Post remind all that a power program before the Grubb decision became a navigation program after the decision. Tax programs of the nation, said Mr. Post, are designed to penalize the company owned by private parties and to subsidize the company owned by political or governmental entities. The



**Louis H. Egan, Union Electric Light & Power; Bernard Weadock, Edison Electric Institute; C. S. McCain, United Light & Power**

23-state, 200-river M.V.A. development, embracing some million or so square miles, was a typical example of a project which would bankrupt privately owned utilities and destroy property of their two million owners and, of course, of such savings bank and insurance company investments which are in these companies. Immoral and dishonest is the P.W.A. program under Administrator Harold L. Ickes, Mr. Post declared. Mr. Ickes might hire unemployed to tear down utility distribution systems and thus do by direct action what he now attempts to do with his 55 per cent loans and 45 per cent gifts of other people's money, said the speaker.

The model acts of 1935 which were sent to the state Legislatures then in session by the P.W.A. Administrator were described by Mr. Post and he reminded his listeners that the failure of legislators to pass these bills in the face of a three-billion-dollar fund made available was an important indication of the high degree of fairness of the bulk of the American people. Frankly, fairly and frequently the operating man must inform the public about his business, said Mr. Post in conclusion, and add this second important job to his first job of building and operating his company.

### *Better seeing and breathing*

The value to the people of the United States of the Better Light-Better Sight Campaign was rather graphically described by Lewis H. Carris in terms of what lost sight means to children and as well the instruction and institutional care extended to those of failing sight. To the industry Mr. Carris offered the facilities and experience of the National Society for the Prevention of Blindness.

Air conditioning, portable room cooling units and house ventilation were the subjects discussed during the last half of the afternoon's program by C. E. Michel, R. H. Tillman and W. G. Moore. Air conditioning as a good-will builder for the utility industry was lauded by Michel. Five thousand kilowatts of air-condition load have been added by his company this year, he said, and recent developments in the portable unit since 1932 have given it a national acceptance applicable to consumers with wide ranges of income. Mr. Tillman said that during the past six years simplification and standardization have resulted in a well-priced, practical load-building piece of equipment. The extent of the future market will depend upon the practical limits of one-room comfort cooling. The portable unit will be a steppingstone, said Mr. Tillman. Nine hundred-watt, 110-volt, self-contained office portable units with removable ducts located near a window and 220-volt, ¾-hp. motored jobs were described in some detail because their present low prices make them readily salable to renters rather than owners of offices. Self-controlled units are suitable only for smaller jobs, said Mr. Tillman, and care should be exercised in the selection of local selling agencies. The executive knowing the pleasures of an air-conditioned office will inevitably be eager for the same comfort in his home, said the speaker. In Doctors' and dentists' offices and other single offices there are large sales possibilities, and the portable unit will move rapidly into homes where single-room cooling may be highly desirable for such uses as assisting invalids, Mr. Tillman said in mentioning the immediate market for portable units.

W. G. Moore closed the program with his talk on house ventilation through the attic. The most generally accepted method of cooling was the term applied to attic cooling, particularly for Southern areas, and when used the utility should supervise the entire installation. This method of cooling was said to be the most practicable way at present of adding 400 kw.-hr. per year to residential bills and to give customers at moderate cost the opportunity of making the first step toward home air conditioning.

## Awards and Election

The final day's session was opened with an address by C. E. Greenwood, in which he first proved by the record that intensive sales development had been undertaken by utilities for at least three decades and, secondly, that selling out of trouble merited the wholehearted co-operative support of the entire industry. The molding of public opinion in regard to electric utilities was said by Adam S. Bennion to be largely a job for utility employees, and he stated in his paper "how can they know" how the employees of the Utah Power & Light Company are organized and inspired to do the job.

Came now the announcement of prize awards by Frank W. Smith, which are set forth in special position in this report. The session and the convention ended with the introduction and installation of new officers, who are named in an accompanying panel.

Special trains for the four points of the compass began leaving St. Louis shortly after noon Thursday, taking delegates back to another year on the firing line. Uppermost in the thoughts of many was the feeling that a united industry is taking its troubles in its stride and is proceeding to solve them one by one in the methodical, sure-footed fashion which has characterized the industry for many years. Informal chats between delegates in hotel rooms, taxis, hotel lobbies and restaurants were impressive for their strong undercurrent of optimism. The industry is now thoroughly alert to the vindictiveness behind political attacks emanating from highest governmental centers, but with heads up, with a new strength gained from adversities.

L. A. Coleman, New York & Queens Electric Light Company, and A. W. Robertson, Arthur Allen and A. D. Peabody of Westinghouse

# To Fight and to Forge Ahead

## Presidential Address Portrays Utility Program of Defense by Law and by Enterprise — Tribute Paid to Flood Workers — Institute Active and Efficient

By THOMAS N. McCARTER*
President Edison Electric Institute

ANOTHER year has rolled around since we met in convention at Atlantic City, at which time it was my privilege to address you upon the condition of the industry and the tremendous problems which confronted it. Without attempting to repeat them in any detail as they were then set forth, I feel it to be my duty upon this occasion to bring down to date the status of the industry in its various aspects.

During the summer of 1935, the Congress passed and the President signed the so-called Wheeler-Rayburn Holding Company Bill, in a somewhat modified form from that in which it was originally introduced, but still highly objectionable in substance; clearly designed in Title I of the act to ultimately destroy Public Utility Holding Companies; and in Title II to regulate in the most minute details, except as to local rates, all such companies engaged in any form of interstate commerce. So far as I know, this act has been pronounced to be unconstitutional by all lawyers who have studied it, except those of the government.

Holding companies affected by the act have, for the most part, declined to register with the Federal Securities and Exchange Commission, as required by the act, and have ignored the same. Some have applied for exemption therefrom under the provisions of the act, and a few have registered. The trustees of the institute employed by the Hon. John W. Davis, who may be properly regarded as the leader of the American Bar today, to represent the institute in contesting the constitutionality of the act. What seemed to be a thorough-going test case existed in the state of Maryland, and in the hearings and arguments in this case, Mr. Davis

*E.E.I. convention address in full.

participated. The act was found to be unconstitutional by the District Judge before whom it was argued, and his decision was affirmed by the United States Circuit Court of Appeals, Fourth Circuit, which court, however, somewhat restricted the sweeping decision of Judge Coleman in the United States District Court. An application for a writ of certiorari was made to the Supreme Court of the United States to review this decision. This application was denied by the Supreme Court and so the decision stands as the law within the jurisdiction of that circuit, but is not necessarily the law of the land until the Supreme Court has spoken.

### *Electric Bond & Share Company suit*

Meanwhile a considerable number of other cases were commenced by companies in different parts of the country to test the constitutionality of the act. These suits the government has sought to have held in abeyance until the issue could be tried out in a case of its own selection, and to that end has commenced suit against the Electric Bond & Share Company, which is now in course of preparation for trial. The government has measurably succeeded up to the present time in having the other cases held back. This case will be defended by the Electric Bond & Share Company, and it has not yet been definitely decided whether counsel for the institute will or will not participate therein.

Meanwhile, however, anticipating that in that case, it will be the policy of the government to endeavor to smear the whole industry with propganda of the character emitted in the Federal Trade Commission's reports, the institute has been preparing itself, with great thoroughness, to meet any such attack should it come. Where wrongful practices have obtained, they will be admitted. But false innuendoes and charges will not go unanswered. In this preparation, the institute has had the services of Prof. John T. Madden and H. B. Dorau, ably assisted by William J. Hagenah. I am as confident as I can be of anything that is to take place in the future, that this act, when it finally reaches the Supreme Court of the United States, will follow the other ten New Deal measures that have already been scrapped by it. So much for the Holding Company Bill!

### *T. V. A. litigation*

The decision of Judge Grubb, referred to in my last annual address, declaring the so-called T.V.A. act to be unconstitutional, was reversed by the United States Circuit Court of Appeals, Fifth Circuit, and this decision of the said Circuit Court of Appeals was reviewed and affirmed by the Su-

preme Court of the United States in a decision which was narrowly limited and restricted to a consideration of the contract that had been executed by the T.V.A. and the Alabama Power Company, relating to the sale of power generated at the original Muscle Shoals plant—the court expressly reserving and excepting from the decision any consideration of the whole T.V.A. project as now planned and under partial construction.

I note with warm approval that nineteen operating companies adversely affected by this contemplated broader plan, have commenced suit to test the constitutionality of this huge project, involving a total expenditure of $475,000,000. This is the sum that they are now talking about, but Major Bennion, who knows more about this subject than I do, tells me that the ultimate cost of the grandiose scheme, if carried to a conclusion, will be in excess of $1,000,000,000. Perhaps he is right. But what is four or five hundred millions of dollars between friends in this day and generation! It would, I think, be impossible to conceive of a more inexcusable and wasteful expenditure of a vast sum of public funds than is contemplated to be spent for the purposes of the T.V.A. yardstick in this sparsely settled and largely undeveloped territory, unless the proposed Passamoquoddy project, now temporarily deferred, is considered to go it one better in useless extravagance.

### *Municipal competition test*

A third class of cases, quite numerous in number, are seeking to have a judicial determination by the Supreme Court as to the constitutionality or unconstitutionality of the government's gifts and loans to municipalities for the erection of municipal lighting plants, to be operated in direct competition with existing facilities of private companies. Here again counsel representing the Institute have participated in this litigation, in the person of the Hon. Newton D. Baker of Cleveland, Ohio, one of the leaders of the American Bar, and one or more of his associate partners. The first case of importance to be heard was that of the Duke Power Company in North Carolina, which obtained a favorable decision upon this question in the District Court, which, however, was reversed by the United States Circuit Court of Appeals, Fourth Circuit, which held this character of loans and gifts to be within the power of Congress. A writ of certiorari to bring this decision to a review has been applied for and granted, and the case will be heard before the United States Supreme Court at its next ensuing term. It is hoped that a decision will be forthcoming on this very important question within this calendar year. Meanwhile there are many other cases raising the same question in various parts of the country, which are passing through the mill of litigation.

### *No industry ever so harassed*

Was there ever an industry so unjustly, so unfairly and so immorally attacked by a governmental agency as has been the lot of the electric industry? If it were not so serious, it would be almost humorous. Here is an industry which throughout its entire history, including the period of the great depression, has been constantly lowering its rates of service to the public, notwithstanding the tremendous burdens of taxation and otherwise that have been laid upon it, being attacked by a government which has itself spent not millions but billions of the taxpayers' money in unprecedented fashion, in furtherance of the various fantastic notions, many of which have already been declared null and void by the Supreme Court. I challenge comparison of the record of the electric industry in the regard of which I have spoken, with any other industry in the country. Its experience has been unique and reflects the greatest credit upon it.

What the attitude of the trustees of the institute in the future in regard to these matters will be, I do not pretend to say. But having put our hand to the plow, I do not think we should stop until these questions are all finally and fundamentally determined. Although, in view of all that has happened to date, I personally feel that the conduct of some of these litigations should hereafter be principally carried on, so far as possible, by the companies directly involved. The expense of it all to the institute has been a serious matter but, happily, its resources are in a position to withstand it, although it will, temporarily at least, absorb all its surplus funds.

### *Perhaps we are over the peak*

I may be overoptimistic, but I think I sense that the peak of this fight has passed. There never was any real basis for it except a few isolated cases of the mishandling of securities by certain manipulators and promoters, the wrongdoing of whom is in no sense chargeable to the industry as a whole. The issue, so far as it was an issue, was one that was politically manufactured. The public is beginning to see that there is nothing in it, and evidence abounds that the great mass of the people in this country are thoroughly satisfied with the service rendered by the industry and the extremely low prices charged for such service, which have now reached in the case of residential customers an average cost price to them of less than 10 cents per day.

In this note of moderate optimism which I am striking in feeling that the worst is behind us, is a belief that the time has come when even the United States Government cannot go on wasting billions of dollars of the people's money in the fashion that has been going on for the last three years, and that boondoggling is not to have a permanent place as one of the great national sports of our country.

Governmental regulation of public utility properties in this country is now about thirty years old. The creation of state regulatory commissions followed some little time after the constitution by the Congress of the Interstate Commerce Commission, which, however, at first, did not possess rate-making powers. This policy of regulation is now so thoroughly ingrained in the American governmental system that perhaps any discussion of it is academic. But perhaps it may not be amiss that I, who have had the rather peculiar experience of watching its progress and development from the vantage point of the same executive position throughout the entire thirty years, should give to you the benefit of my observations with regard to it.

### *Regulation of utilities*

It has an asset side and a liability side. So far as it refers to the character of properties with which we are concerned, it was started with the double purpose of regulating them as to adequate service and rates in the public interest and of preventing the indiscriminate granting of franchises for service to rival bidders in the same locality. This was a great evil of the early days which regulation has very largely, if not altogether, cured in the electric and gas business, though not in the transportation business. Then too the form of regulation generally adopted was that of state regulation

by a state board, which was infinitely preferable to the attempt by municipalities to exercise the same general powers. I think it is generally recognized that a certain measure of regulation, as to service and the issuance of securities, by state boards has been of benefit to the public and not harmful to the companies.

Such troubles as have come have sprung from the unreasonable demands upon commissions by politicians and a manufactured public clamor, which the commissions have so often been unable to withstand. In short, they have too largely been governed by politics and not by the broader public point of view. In many cases, this situation has been aggravated by the appointments to the commissions, which have been very largely made for political rather than quasi-judicial purposes. As usual, history has repeated itself and many of these commissions, starting with moderate powers, have sought more and more authority, until it is frequently difficult to say where regulation ends and management begins.

### *Regulation or management?*

I have no quarrel with proper regulation of public utilities. But I am unalterably opposed to it when it seeks to include management, for this is the worst kind of governmental ownership because it lacks financial responsibility. An extreme illustration of the evil to which I am referring seems to me to exist in the recent order of the Interstate Commerce Commission, directing the steam railroads in the eastern section of the country to very substantially reduce their rates, in many cases as much as 50 per cent.

It is a notorious fact that the railroads, under the rate of fare that has been existing, are not earning a fair return upon the value of their property devoted to the public use. Starting with this admitted fact, the Interstate Commerce Commission substitutes its judgment for that of the directors of the railroads and orders the reduction to which I have referred, upon the theory that it will increase the returns of the railroads from their passenger business. Maybe it will and maybe it won't. I do not pretend to know. The railroad directors say it will not. This, it seems to me, is management pure and simple as distinguished from regulation. And I am happy to see that most of the railroads affected are preparing to test its legality.

### *Institute functioning effectively*

In all respects, the institute has had an active year. Its committees have been called upon to deal with work of far-reaching importance to this industry. The engineering, insurance, statistical and rate committees have done excellent work as usual. To enumerate all the matters handled by these committees is not practicable, but the overall effect of their work in progress and improvement in the industry is apparent to anyone who will take the trouble to compare present with past performance. The record shows continued improvement and these committees over a long period of years have played a large part in producing this splendid result, of such great value to the people of this country. For that matter, the whole world has profited greatly because the studies, reports and deliberations of these committees have always been eagerly sought after throughout the civilized world.

The accounting committee, under the leadership of G. U. Stewart of the Philadelphia Electric Company, has been called upon for especially heavy duty. A proposal of the National Association of railroad and Utilities Commissioners for a revised Uniform System of Accounts and also a Classification of Accounts proposed for adoption by the Federal Power Commission were referred to the institute with a request for comments and suggestions. Both proposals called for much more elaboration in accounting than the existing Uniform Classification of Accounts adopted in 1922, and they would introduce important changes in some of the fundamentals of utility accounting and economics. If the principles suggested should be adopted by these authorities, and could be legally enforced, much of the value of the property of operating companies would be destroyed.

Both of these proposed systems of accounts were carefully reviewed and detailed criticisms were submitted as requested. Hearings between the accounting representatives of the industry and those of the National Association of Railroad and Utilities Commissioners and of the Federal Power Commission were held in Washington. These hearings will be followed by a conference between representatives of the institute and the Commissioners of the Federal Power Commission themselves and also by a conference with the Executive Committee of the National Association of Railroad and Utilities Commissioners.

At the same time that criticisms of the proposed systems of accounts of the Federal Power Commission and of the National Association of Railroad and Utilities Commissioners were being prepared, our accounting committee also prepared its own proposed revision of the existing 1922 Classification of Accounts. Much care has been devoted to the preparation of this proposed revision. It represents a large amount of work by skilled and experienced accountants of the industry and when submitted to the National Association of Railroad and Utilities Commissioners it should command serious consideration on sheer merit. It was our privilege to hear this entire subject brilliantly discussed in the

**Morrison Blake and George E. Whitwell, Philadelphia Electric Company; George R. Conover, Philadelphia Electric Association**

symposium that was led by Mr. Nash.

The work of the sales committee in promoting the use of electricity wields an influence in our industry that can scarcely be overestimated. The various national sales programs in which this committee has played a leading part have not only succeeded in promoting the business of our companies but have served to create better understanding and a spirit of good will among the various branches of the industry and other business elements interested in the sale of electrical appliances. They serve also to call to the minds of our customers the value of their electric service.

### *Work of sales committee*

The increases in kilowatt-hour sales to residence consumers during the past years are noteworthy and are in large part attributable to these sales programs. Started several years ago, they were slowed up somewhat during the worst years of the depression but have since been gaining momentum. Several governmental agencies are claiming credit for this development but it should be observed that a sales program to promote the idea of electric refrigeration, for example, was launched on a nationwide basis by this industry four years before the New Deal era, and other national sales campaigns had preceded that. It is necessary to go back twenty-five or thirty years for the beginning of sales programes.

The Electric Refrigeration Sales Campaign, started in 1929 and officially closed in 1934, was extraordinarily successful in building up this comparatively new use for electric current. Its effect continues. Sales of refrigerators in the first part of 1936 are far ahead of sales in any previous year. The Better Light—Better Sight Program, begun in 1933, is likewise gaining momentum and its influence will undoubtedly extend many years into the future. I feel that this will be true also of the Kitchen Modernizing Program, which is destined to play a large part in the development of residential sales. In the matter of farm electrification also the institute, through its rural sales committee, is helping to develop greater use for electricity on the farm, which will make it not only convenient but profitable to the farmer. Thus the institute plays its part in the affairs of the industry and contributes its share toward advancing the general welfare.

I desire to comment particularly on the value to the industry of the Annual Sales Conference held this year in March in Chicago, and the annual Engineering Conference held in May in Detroit, to which conferences are invited a wider group of representatives of power companies than the membership of committees, in order that a larger number of the men in the industry may enjoy the benefit that comes from attendance at such meetings. Plans are under way to establish the practice of holding an annual Accounting Conference also.

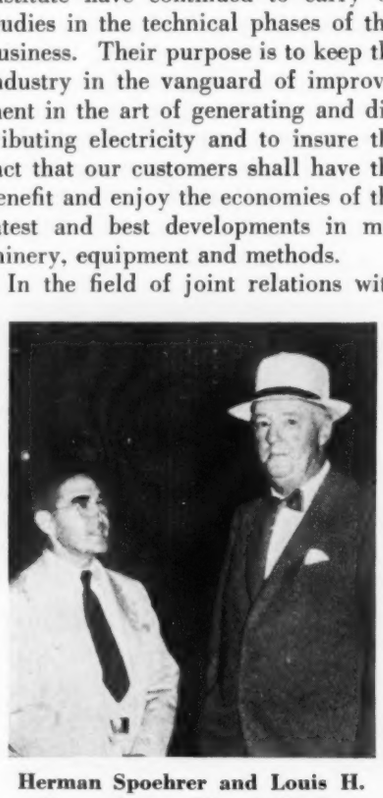
Less in the limelight than residence service, but of even greater importance to communities and to the people as a whole, is the progress that is being made in the greater use of electricity in industry.

Feeling the obligation to make available to the public authoritative information relating to the electrical industry, the institute publishes regularly a large volume of statistical and technical information. In no other country in the world is such full and complete information concerning operation of the electric light and power industry made available to the public as in this country.

### *Engineering conferences*

The engineering committees of the institute have continued to carry on studies in the technical phases of this business. Their purpose is to keep the industry in the vanguard of improvement in the art of generating and distributing electricity and to insure the fact that our customers shall have the benefit and enjoy the economies of the latest and best developments in machinery, equipment and methods.

In the field of joint relations with other organizations, the institute deals with a great variety of matters of mutual concern, with the object of advancing the interest of this industry consistent with the common interest and to prevent or minimize the development of difficulties and misunderstandings. During the year the extension of rural lines has caused some apprehension on the part of communiciation services, notably farm telephone organizations. The matter has been dealt with by the institute in an effort to avoid the development of difficulty.



**Herman Spoehrer and Louis H. Egan, Union Electric Light & Power**

The institute has contributed substantially in the rewriting of the National Electrical Code and in preparing new wiring specifications. Developments in the field of wiring are highly important in conjunction with our sales programs for electrical appliances to bring about the greater use of electric service.

### *Board of trustees*

During the year the operating committee and the board of trustees have met from time to time to deal with policy questions of general concern to our members, in addition to the usual business concerns of the industry. I might mention the program of the government for rural electrification and proposed additional legislation on that subject, the proceedings of the Securities and Exchange Commission and of the Federal Power Commission relating to the Public Utility Act of 1935, the proposed Mississippi Valley Authority, the proposed Northwest Power Agency, new taxation legislation and the proposed System of Accounts of the National Association of Railroad and Utilities Commissioners —all of which matters necessarily have required the attention of your governing committees.

The staff organization of the institute has also been actively engaged. It will be appreciated that in an industry of the size and importance of ours there is a large volume of business to be handled in carrying out the routine programs laid down by the committees and in collecting and supplying information concerning the industry to its members and to those outside the industry who are interested in or concerned with its affairs.

### *Heroic work during flood*

For sheer heroism, self-sacrifice and devotion to duty on the part of workers in industry, I recall no finer ex-

ample than that displayed by employees of various utility companies during the unparalleled floods that devastated many sections of the Eastern states last March. The electric, gas, telephone and water companies as well as the railroads, did valiant service under extremely harrowing conditions. I dwell particularly, however, on the part played by the electric companies in restoring service in the stricken communities, not because their efforts were more worthy of commendation but by virtue of my connection with the industry I happen to be more familiar with the assistance rendered in the electrical field.

We have become accustomed to feats of bravery and tremendous sacrifice by men and women in war times. We have known of great hardships endured by human being in devotion to some particular cause. Not at all unusual are stories of bravery and extreme courage in emergencies on the part of our public servants, such as firemen, policemen, G-men. There is no peril we hesitate to confront in the protection of our loved ones.

### *Tribute paid to staffs*

But what particularly impressed me in this recent disaster was that this same spirit of unselfish disregard of personal injury or discomfort impelled employees of our great electric industries to hurl themselves into the terrific fight to maintain service at any cost. With no thought of personal reward or glory, these men and women were actuated by an innate sense of duty and loyalty. There was a job to be done—and they did it!

When the floods descended upon the municipalities and the water crept up foot by foot in the generating stations, the men who are responsible for electric service 24 hours a day, every day in the year—to homes, hospitals, stores, factories—realized that nothing short of herculean effort could keep that service intact. They went to work—in water up to their waists, without food, without water to drink, without sleep, without protection from live circuits—and continued at their tasks for 24, 48, even 72 hours, in many instances, in the vain endeavor to keep the current flowing, needed now more than ever before in the face of death and destruction on all sides. When the water continued to rise the crews retreated to the upper floors amid the switching gear while the increasing violence of the floods threatened the boilers and the turbines. The fires were banked to prevent explosions and all efforts were concentrated on the "drying out" process.

In many localities temporary substations were built, emergency lines were run, switching equipment installed and feeders which had no power were connected to feeders which did have current. It was a continuous struggle against one of the most powerful of Nature's forces, and the story of how many lives were saved and how much human suffering was averted by the electrical workers can never be told.

### *Companies lend men and materials*

No story setting forth the heroic work of the employees is complete without recognition of the splendid manner in which various public service companies responded to the call for assistance from those more seriously handicapped. Throughout the stricken areas men and equipment were hurried from one company to another—and as soon as the new forces arrived they set to work with the same energy and determination as those already on the scenes. Emergency connections were made by means of which power was drawn from outside sources, in some instances quite distant points, to carry on for the stations which had been temporarily put out of commission.

Crews of experienced workers including engineers, linemen, cable splicers, and others, and carloads of cables, testing equipment and other vitally essential materials were shipped into the stricken districts by companies which had escaped the ravages of the flood or had suffered less than their neighbors. In short, the central station industry, from the highest officials down through the ranks to the humblest employees, marked up a noteworthy record of achievement which the country and the industry as a whole will not soon forget.

### *Growth alleviates difficulties*

The growth of the industry during the past year has, I think, been phenomenal under the conditions that have existed. I will not burden you with a repetition of statistics, with which I think you are all familiar, but the record is one of achievement and of progress, and is very promising for the future. If we could be permitted to devote all our energies to the development of the electric business, reasonably free from political and governmental attack and opposition, there is no telling to what limits the expansion of the industry would go.

The two years that it has been my privilege to serve as your president have constituted a time of great strenuosity. The presidency of this institute, in times like the present, is a serious, nerve-racking undertaking. If I have been able to be of any help to the industry, I am very happy. And I trust that you will all overlook my shortcomings, whatever they may have been. I have at all times had the complete and cordial co-operation of the entire working personnel of the institute, whose efficiency it is a pleasure to recognize.

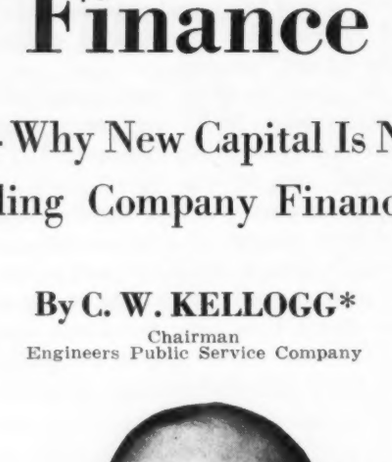
### *Institute personnel appreciated*

It had been my hope, during my administration as president of the institute to visit the membership of the institute, some of whom I think rather rightly feel that they are remote from its daily activities. I had hoped to "swing around the circle," as it were, not only for the purpose aforesaid but also for the purpose of presenting to such persons as our membership in the different localities might desire me to meet, the real motives and purposes that actuate our great industry. But in the stress that we have been through it simply has not been physically possible. In 1912, as president of the American Electric Railway Association, in company with others, I conducted such a tour, which was highly beneficial, although as it has turned out, nothing could stop the downward trend of that particular industry. A good example of the benefit derived from such an effort is apparent from the work of the present president of the New York Stock Exchange, who has been all over the country, preaching the gospel of the faith that is in him. And our distinguished guest of today is doing a similar service for the great composite business union of the country, the United States Chamber of Commerce. I indulge the hope that the new administration will have the inclination and the opportunity to undertake some such endeavor. It would be time and money well spent. I am now laying down the duties of this office, but I pledge to my successor, when chosen, my fullest co-operation and the fruit of my experience.

# Utility Finance Today

## Present Money Market — Why New Capital Is Not Used — Effect of Federal Competition — Holding Company Financing Service Is Necessary

By C. W. KELLOGG*
Chairman
Engineers Public Service Company



THE arrival of the Great Depression found the finances of the electric industry as a whole in sound condition. As this condition had been built up over a long series of years, it reflects well-deserved credit upon the financial conservatism which has marked the growth of the industry.

The total property, fixed and liquid, less reserves, amounted to $14,251,000,000 and was represented by only $13,686,000,000 of stocks, funded debt and advances. Of this total of securities, $6,679,000,000, or somewhat under 49 per cent, was funded debt. The importance of this conservative debt ratio to the investor and to the consumer can hardly be overstressed. Borrowing such a proportion of capital as can be safely done is presumably in the interest of the consumer, on account of producing the lowest over-all cost of money, but excessive borrowing hurts investor and consumer alike. A very simple calculation will show that increasing the funded debt ratio from 50 to 60 per cent requires a 20 per cent higher total rate of return on property value in order to make the bonds salable in each case on an equal basis. The industry has served the country well, therefore, in building up and maintaining such a sound financial structure for the public service.

The 1932 census report shows that the combined net income of $892,500,000 represented a return of 5¾ per cent on the gross investment, fixed and liquid, and 6¼ per cent on the net investment, after deducting reserves. Interest and amortization on funded and floating debt averaged 5¼ per cent, dividends on stocks averaged slightly over 7 per cent or a combined return on all securities of about 6.2 per cent. These figures indicate a sane balance between the desire of the consumer, on the one hand, for the cheapest possible financing and the necessity, on the other hand, to offer a rate of return such as to attract new capital to the use of the public.

Since the depression the aspect of financing (that is the raising of capital) by the electric utilities has been radically different from that prevailing during the previous period. Through 1930 the history of the electric industry, due to the continual growth of the business, had been at all times characterized by the problem of obtaining the $5 or more of capital required on the average to earn $1 of gross receipts. After 1930 the growth in earnings largely ceased, so that such plant extensions as have been required since then could be provided for almost entirely by current reserves. This change is clearly shown by a few basic figures. In the eight years from 1923 to 1930 both inclusive, which cover approximately the period of post-war prosperity, the electric utilities expended for construction an average of $830,000,000 a year. During the same period the amount available for construction from retirement reserves and other surplus funds averaged about $205,000,000 per year. Hence during that period the difference of about $625,000,000 a year, had to be raised by the sale of securities.

Omitting 1931 as a transition year, the last four years, 1932 to 1935, both inclusive, find the earlier normal conditions reversed. The total annual construction expenses of the industry averaged $186,000,000 for these years, while the amounts available from reserves and other surplus earnings averaged $256,000,000 per year. The difference of $70,000,000 per year was probably applied largely to the reduction of debt.

It is worth pointing out here that the decrease in construction expenditures during the last four years has not meant the development of a "power shortage," as has been maintained by those who seek a plausible excuse for pushing a program of federal government development of water power. The following figures for the entire electric industry speak for themselves: At the end of 1929 the total generating capacity of the industry, exclusive of federal government projects, was 28,267,000 kw. and the output generated in that year was 90,277,000,000kw.-hr. At the end of 1935 total generating capacity was 33,446,000 kw. and the output that year was 92,328,000,000 kw.-hr. Furthermore, although the installed generating capacity thus gained over 5,000,000 kw. during the period in question, the revenue from consumers was about 1 per cent less in 1935 than in 1929.

While the last four years have not required any substantial amount of new capital to be raised by the electrict companies through the sale of securities for extensions to physical property, yet there has had to be a considerable amount of activity in the refunding of bond issues which matured during the period. In the early part of the period in question these refundings were in many cases accomplished only with great difficulty and at relatively high interest cost. Bond

*Abstract of E.E.I. convention paper.

yields in 1932 for example were higher (except for 1920) than in any year since the seventies of the last century.

The continuation of the depression, however, involving the piling up of investment funds on the one hand and the drying up of demand for such funds on the other, has produced a transformation in money market conditions really unparalleled in the history of this country. Within two or three years bond yields went from practically the highest point in 60 years to the lowest level in our entire financial history.

An interesting measure of the degree of stability of the electric industry in the face of depression conditions is furnished by some figures recently compiled by Dr. Dorau as to receiverships during the years 1931 to 1935 both inclusive. The total cost to the investor of electric utility securities, both operating and holding companies, in receivership during the period in question was about 5 2/3 per cent of the fixed capital in the industry, and the loss to the investor about 4 2/3 per cent of such capital. This compares with 21.7 per cent in the case of steam railroads and 37.5 per cent in the case of foreign securities outstanding December 31, 1935. A comprehensive study of real estate securities during the period mentioned shows 61.7 per cent of them in default. Since the holding companies have been charged with being the the chief offenders in the alleged financial delinquency of electric utilities, it is proper to point out that the losses through receivership to investors in operating companies were nearly half the total of such losses, the loss through holding company securities thus representing but 2½ per cent of the total fixed capital in the industry.

### *The present money market*

The present money market is, compared to any previous condition in the past, a most unusual and interesting phenomenon. As a measure of the extent of reduction in interest rates for investment funds, I have analyzed bond prices of nine of the highest grade bonds of operating electric utilities which apparently were not artificially affected by call price. For the seven years ended 1934 the average yield of these bonds at their market price was 4.89 per cent and the average deviation from this mean during the seven-year period was but 0.13, showing an extraordinary stability through the depression. Bonds of the same companies, after refunding, averaged in 1935 and 1936 (through April) to yield 3.54 per cent, a reduction of 27.6 per cent from the previous period, compared to an average variation of but 2.66 per cent in the earlier period. Recent offerings of utility preferred stocks for calling and refunding earlier issues bearing higher dividend rates, while smaller in face amount than bonds, show fully as great a decrease in yield as was cited for bonds.

This radical change in conditions contains implications which the industry must consider most carefully. In view of the not yet forgotten generalities which were broadcast in 1928 and 1929, I disclaim any idea that the change represents a "new era," but it is at least a new condition. It appears to be a natural result of the law of supply and demand. On the one hand, there is continued pressure for the investment of the people's savings by the great reservoirs of capital like the life insurance companies and by individuals, and, on the other hand, due to business depression, practically no demand for funds for plant investment. It would be natural to suppose that money will continue cheap until the demand for new capital is restored by renewed business expansion and that when normal business growth returns interest rates also will tend to return to normal.

The dearth of need for new capital could not be better demonstrated than by the experience of the utility bond market in the recent past. In the 14 months ending April, 1936, $1,510,000,000 of utility bonds have been sold—an amount equal to about a quarter of the entire funded debt of these companies. Yet out of this huge total only $15,000,000, or about 1 per cent, represented new capital, all the rest being merely the refunding at a lower rate of interest of previously existing debt.

The effect of this decreased interest charge on such a large proportion of the utility capital may be (to the extent it affects the total cost of capital) to cause regulatory commissions to lower the rate of return they will allow on utility property. The process thus involved is to take from the capital class and give to the electric consumer, not by fiat, but through the operation of economic law. In this connection it should be pointed out that the savings from refinancing are never as large as they appear on their face. In every case bonds or preferred stock have to be called at a premium, sometimes a very substantial one, and, in the case of bonds, the income tax on the increased net resulting from lower interest charges eats up a part of the saving. Furthermore, increased rates for taxation in future years may offset the entire saving from refinancing.

### *Effects of government competition*

Up to the time of the New Deal government competition was not a factor of general financial importance to the electric industry. The advent of T.V.A. and P.W.A. has introduced entirely new features into government competiton, which, if they are to become permanent policies of our country, may well give cause for concern to utility investors. In the case of T.V.A. a major part of the investment is allocated to something else than power. Through the last fiscal year T.V.A.'s construction charges of $48,487,500 were allocated $3,142,500, or about 6½ per cent, to electricity and the other 93½ per cent to things the taxpayer donated. The most recent New Deal proposal, for a Mississippi Valley Authority, eliminates interest in computing charges for power. The P.W.A. has broadcast an offer to any and all cities to donate 45 per cent of the cost to any city that wants to compete with its local utility company.

The public policy involved in such accounting methods of the T.V.A. and in the handouts of the P.W.A. are of course outright subsidies, from the taxpayers as a whole to the people in certain restricted areas. They represent not ordinary economic commercial competition but direct strong-arm interference with normal economic conditions in the specific sections chosen for such largesse. Where they occur they may produce serious financial results for the utilities involved. That this is no idle guess is indicated by the fact that in the Commonwealth & Southern system recent price quotations of the 6 per cent preferred stocks of its six principal subsidiaries showed an average of 105.2 for those outside the T.V.A. territory and 70 for those within that area.

We can only hope that in time, as the depression passes, a more sane and balanced policy of government activity will emerge.

One of the radical changes in regard to financing which recent years have brought forth is the Securities Act of

1933 and the Securities and Exchange Act of 1934. Prior to the amendment by the latter of some of the personal liability provisions of the former, the act at first appeared to be so strict as to be likely to make financing in all but exceptional cases wellnigh impossible. The two difficulties which seemed insurmountable were how to get a director to assume such crushing personal liability as the original act provided, and how investment bankers could safely make future commitments of a length commensurate with the time required to prepare and file a registration statement.

### *Effect of securities act*

The first of these difficulties has been measurably solved by the amendments to the original act, which allow directors to rely on statements of engineers, accountants and other experts, and the second by commission ruling permitting bankers to delay their commitment to buy securities to within three days of the effective date of the registration statement.

The expense and delay incident to registration under the Securities Act have no doubt acted as deterrents to financing but my opinion is that on the whole the act is for the best. This opinion is concurred in by many of the larger investors and the investment advisory services.

Of the 78 utility bond issues sold in the fourteen-month period ended April, 1936, nineteen were sold direct to large investors without any general public offering. This was done partly no doubt in order to save bankers' commissions, but principally to avoid the expense and director liability involved in registration under the Securities Act. These nineteen issues comprised, however, only 13 per cent of the total amount sold during the period. In the case of very small issues, where marketability would be at a minimum and the relative cost of registration high, such direct sales are no doubt justified, but for important issues it is believed that for the future market, if for no other reason, registration is desirable.

I have attempted to assemble figures regarding the cost of registration under the act, but they depend so much on the special conditions surrounding each individual case that any general statement must be subject to substantial variation in any specific situation. An approximate formula of cost would be a flat charge of $25,000, plus $\frac{3}{4}$ per cent for the first $10,000,000 face value, $\frac{1}{2}$ per cent for the second $10,000,000 and $\frac{1}{4}$ per cent for all excess over $20,000,000. Below two or three million size the cost of registration might be prohibitive. One of the practical suggestions that has been made to improve the workability of the act is to simplify the registration requirements or to omit the registration statement as such and have the prospectus take its place, supporting exhibits being filed with the commission. It has been estimated that 25 to 30 per cent of the cost of registration might be saved in this manner.

As an offset to this, it should be noted that the percentage charged by investment bankers, the so-called "swing," is much lower now than it was ten years or more ago, probably due in large measure to the fact that most of the recent sales were for refunding. For the $1,280,000,000 of bonds sold by electric utilities through bankers in the fourteen-month period ended April, 1936, the average total swing charged by the bankers was but 2.15 points, which was less than rates prevailing ten years ago by much more than the cost of registration under the Securities Act.

### *Place of holding company*

In my earlier remarks I commented on the conservatism and soundness of the electric utilities' financial structure and stressed the importance to both the investor and the consumer of having the debt ratio down to 50 per cent of the investment. But who has created and who will maintain this condition so essential to financial health? Certainly not the bondholder. He is simply a money lender who puts his money out on the best security he can obtain. Not the banker. He is simply a merchant who buys and sells; and the product must be made salable by someone else before he can afford to touch it.

### *Common stock source of health*

The only one who can perform this essential act, without which the whole structure falls, is the stockholder. It is true that a part of the equity cushion for making the bonds ride smoothly can be and is furnished by the preferred-stock holder, but he too is merely a money lender of the second degree, who gets compensated by a higher yield for his more risky part in the job of financing. But both these classes rest squarely on the investment of the common-stock holder, who takes the entire risk and is therefore the real source of financial life and health for the utilities. Furthermore, on account of the inability to sell substantial amounts of preferred stock due to the relatively limited market for such securities, the common stock as a whole has been obliged to furnish about 64 per cent of the equity base for the bonds of the electric utilities. There is some reason to doubt that preferred stocks will sell as freely in the future as they have in the past and if the Holding Company Act is upheld by the courts, preferred stocks will be ruled out entirely, thus placing 100 per cent of the bond equity burden on the common stock.

The foregoing is true for any corporate organization which has need for capital funds, but the reason it is of such transcendent importance to the utilities, compared to any other line of business activity, is inherent in the nature of the utility business. The last U.S. Census of manufactures, analyzing all the important manufacturing industries of the country, showed that on the average they have 71 cents of plant investment for each dollar of annual gross revenue. In the case of the electric utilities, this figure varies as between steam and hydro companies and with other conditions, but on the average, they require at least $5 of plant for each dollar of annual gross revenue—seven times as much as the average industrial enterprise. This high investment ratio is one of the fundamental factors that makes the utilities a natural monopoly since investors would not dare to risk so much capital on a competitive venture, and has logically led to public regulation for the protection of investors and consumers.

The utility, by this commission regulation, is limited to just enough return to attract new capital, so that everything it gets by way of net earnings should go to its bond or stockholders. Hence the only funds from operation which it has for plant expenditures (save those foregone by the stockholders) are the accruals to its retirement reserves, an amount which, with 10 per cent growth per annum, would furnish about a fifth of the year's plant requirements.

This is why, in times of normal growth, an electric utility's need for new capital is not an occasional requirement, but a hardy perennial.

It might seem pointless to have restated as above what you all know so

well, if it had not been in the past so often overlooked or not realized, and if it had not been the one reason why, if holding companies had not existed before, something to perform the same financial function that they perform for the operating companies would have had to be discovered and developed.

What was the life financial history of the operating electric utility companies before the holding companies stepped in and built up their equity base? Outside of the few large cities, some local banker, manufacturer or merchant started an electric plant, just as he would any other new industry. He then discovered what a capital devourer such an institution was. Sometimes he put in a lot of his own capital; more often the plant was simply starved for capital and poor service resulted. In most cases it was impossible to make a successful stock offering because the marketability was so small.

### *Holding company was imperative*

Then came the holding company, which by the size of a combination of properties was large and diversified enough to raise this essential equity money from its own credit by the public sale of its own securities. Of course the holding companies did much more than this, their principal services being: to get electricity out into hamlets which but for their activity would have had none; to improve design, operating methods and economy; to assist in marketing the senior securities of the operating companies, and the like. But their absolutely essential rôle was to raise the common stock money which most isolated properties could not do but had to have.

From 1923 to 1930, both inclusive, the huge sum of $6,640,000,000 was invested in the electric light and power business of the country; about one-half of its present vast property was assembled in those eight years. Without the holding companies furnishing at least a quarter of this great amount through the common stocks of the companies, this capital could not have been raised and many millions of the people now enjoying the blessings of electricity would be without it today.

Due to the abuse and criticism of various evils which have grown up with some holding companies (which I neither excuse nor condone, but are beside the point in this discussion), this great epic of what they did that was truly essential and constructive in a financial way has never been written. Here are some figures which I have assembled for this paper. An analysis of the sources of funds for plant expenditures by the operating subsidiary companies of twelve principal holding companies for the years 1925 to 1930, both inclusive, shows:

Total plant expenditures, $3,071,000,000, or 100 per cent. This was raised as follows:

| | | |
|---|---|---|
| 1. By Operating Companies | | |
| (a) Through sale to the public of their own securities | $1,478,900,000 | 48.1% |
| (b) Through investment of appropriations to retirement reserve | 530,900,000 | 17.3% |
| Total operating companies | $2,009,800,000 | 65.4% |
| 2. By Holding Companies | | |
| (a) Through sale to the public of their own securities | 794,100,000 | 25.9% |
| (b) Through net earnings withheld from common stock | 267,100,000 | 8.7% |
| Total holding companies | $1,061,200,000 | 34.6% |

Without this large and essential equity base of 34.6 per cent this huge investment program either could not have been financed at all or would have been financed at the price of destroying the soundness of the whole financial structure of the operating utilities affected.

In a word, the strong equity position in which the electric utilities on the average found themselves when depression descended upon the country was not chance, did not just happen—it was the result of long years of planning and foresight on the part of those who alone had the responsibility for keeping the operating utilities strong financially—principally the holding companies. It is significant to note in this connection that most of the failures of holding companies during the depression were in cases where such companies had failed to perform adequately their function of equity financing.

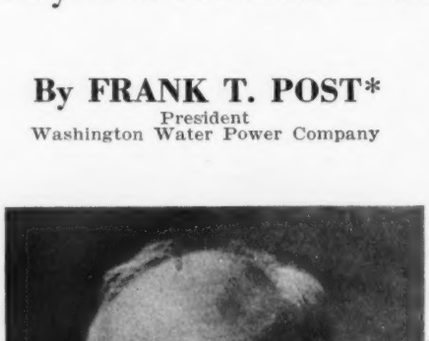
Government protagonists have attempted to draw invidious comparisons between operating companies and holding companies in the utility field, the former being pure and undefiled and engaged in a righteous service to mankind and the latter mere harpies, interested only in high rates and swollen dividends and unholy profits. If the operating companies are sound and good financially (which the census figures show that they are on the whole) it is by and large (except in a few large cities) the holding companies that have made them so. The public often does not realize the essential nature of the financial help the holding companies furnish to the operating companies because it has been done so efficiently and unostentatiously.

**I have always felt and still do that the evils that have arisen in the past in connection with holding companies should be regulated by the federal government, but I object to the Alice in Wonderland method of "off with his head" as the universal way of regulating matters. It is often easier to kill something than to regulate it, but it is not always the most intelligent solution. Before the government destroys the public utility holding companies it should have a clear idea of how the function they perform can be performed by the small parts into which the "death sentence" would break up their properties. It should be sure of the answer it can make in later years to the consumer whose electric service suffers or fails for lack of equity financing. It should decide beforehand what it will say to the bond investor as to where he is to look for the protection of his bond. It should study carefully and with open mind, not blinded by hate, the figures I have given as to what the holding companies have actually done before ruthlessly destroying such a useful public servant.**

# The Campaign to Destroy

## Planned Political Program for Government Ownership Through Federal Subsidy — A Play in Four Acts — What Needs to Be Done

By **FRANK T. POST***
President
Washington Water Power Company



ABOUT a year ago I heard President Roosevelt say in one of his radio speeches that everything that had been done during his administration and everything that was being done or in contemplation fitted in with and is a part of a well-considered plan. He did not define the plan. My mentality is unequal to the task of forming any satisfactory conclusion as to the character of this major and magic plan. However, it would seem that the Administration plan for the electric utility industry may be determined almost to a mathematical certainty. I purpose to assemble several steps, acts and performances during the past three years of and by President Roosevelt and the inner circle of political favorites, and demonstrate that their plan and program is the strangulation and destruction of the privately owned electric utilities, for the purpose of bringing about public ownership and political operation as the ultimate goal.

About three months ago, and just before he started upon his vacation in foreign waters, President Roosevelt sent a message to Congress asking for the passage of a new tax bill which he asserted would raise additional revenue to the amount of about $600,000,000. In that message he proposed a fantastic method of extracting these millions from the people, which method he contended would be both painless and popular. One of the unique and interesting features thereof is the repeal of the existing income tax law so far as it applies to corporations, and the repeal of the capital stock tax law and of all other existing taxes, and substituting a graduated tax upon undistributed net earnings. I said that the new plan contemplated the repeal of all existing corporate taxes, but that statement is inaccurate, because the President did not suggest the repeal of the discriminatory electric utility tax of 3 per cent of revenues received from the sale of electrical energy for domestic and commercial consumption. That discriminatory tax, under the plan, is not to be touched. The story of that tax law is instructive.

*From modest beginnings*

In 1932, for the purpose of raising more revenue, the Congress passed a law imposing a tax equivalent to 3 per cent of the amount paid for electrical energy for domestic and commercial consumption to be paid by the person paying for such electrical energy and to be collected by the vendor. And under that law it was immaterial whether the vendor of such electrical energy was a privately owned utility or a publicly owned utility. The tax was paid by the customer. The government received under that law a considerable number of millions, about $3,500,000 per month.

In 1933, when the New Deal Congress, elected in November, 1932, began to function, this statute was amended by providing that the 3 per cent tax shall not be paid by the customer, but be paid by the vendor when such vendor is a privately owned utility, but when such vendor is a city, town, county, power district or other publicly owned utility there is no tax and the government gets no money. The amendment states: "None of the provisions of this section shall apply to publicly owned electric and power plants." Under this amendment, passed by the New Deal Congress, the Treasury of the United States gets less money than under the Act of 1932, to the extent of at least $3,000,000 per annum.

The legislation passed in 1933 and to be passed in 1936 creates a condition of unjust discrimination against the privately owned utilities in two respects: (1) the electric utilities are compelled to pay the same taxes as all other corporations and an additional tax amounting in the aggregate to about $35,000,000 per annum; (2) the cities, power districts and other publicly owned and politically operated utilities, which are either potential or actual competitors of the privately owned utilities, are exempted from this additional and discriminatory tax and in fact they pay no tax of any kind or character to the federal government. This exemption from taxation of course constitutes a subsidy for the politically operated utilities. This 3 per cent tax, if imposed upon the politically operated utilities, would produce a considerable sum of money much needed by the United States Treasury. The reason for this discrimination is patent, because there can be no reason except the desire of the Administration to penalize the privately owned electric utilities and subsidize and encourage public ownership.

*Senators are high priests*

It will be conceded, I think, that Senator Norris and Senator Bone may be referred to properly and respectfully as High Priests of the Public Ownership Cult. It will be remem-

*Abstract of E.E.I. convention paper.

bered that in the campaign of 1932 Mr. Roosevelt, making a campaign speech in Seattle, took Mr. Bone to his bosom and congratulated him on leaving the Socialist party and joining the New Deal. It will also be remembered that during that campaign Mr. Roosevelt stated that he saw eye to eye with Senator Norris and that their ideas and ideals were in perfect harmony. So I may assume that Senate Bill 3524, introduced by Senator Norris and known as the Mississippi Valley Authority bill, has the approval of those in high command and as such may be critically analyzed. That bill purports to create a supergovernment over all the states in that great empire, comprising about 1,180,000 square miles, the waters of which, if undiverted, flow into the Mississippi River, with the exception of the Ohio River Valley, which by Section 21 is turned over to the tender mercies of the Tennessee Valley Authority.

The objects of this act as stated therein are: (1) Flood control; (2) improved navigation; (3) irrigation; (4) restoration of water levels; (5) protect fertility of the soil, and last, but not least, (6) generation, transmission, distribution and sale of electricity. The business of this authority will be conducted by a board of three directors appointed by the President. The corporation will be financed by the United States Treasury. The corporation will have power to construct an unlimited number of dams in the Mississippi River and its tributaries and unite all power installations into one or more systems. The cost of the dams and other improvements shall be allocated by the board of directors and charged to: (1) Flood control; (2) navigation; (3) irrigation, and (4) power development, and paid by the taxpayers of the nation. The allocation findings made by the board, when approved by the President, shall be final. The board is authorized to sell the electric energy not used in its operations and for operation of locks and other works, to states, counties, municipalities, corporations, partnerships or individuals, giving preference to states, counties, municipalities and co-operative organizations of citizens or farmers, provided that all contracts made with private companies or individuals for the sale of power which will be resold to the public shall contain a provision authorizing the board to cancel such contract upon one year's notice if the board shall conclude that it needs such power to supply the demands of states, counties and municipalities.

The author, of course, knew that this provision about selling power to private companies or individuals, which might be resold, is a bit of humbug because, except for temporary power in case of great emergencies, no private utility would enter into a contract to purchase power for resale to the public when such contract could be canceled upon one year's notice. A private utility must at all hazards furnish firm and dependable electricity to its customers for light and power purposes. It cannot make an arrangement where it might be required to shut off the lights or shut down the motors because the owner of the generating units might cut off the supply in order to give power to somebody else. Manifestly no sane management would make any such contract, and the provision in this act about selling power to private companies is not placed therein in good faith. It is political camouflage.

### *Government power pays no taxes*

This bill and other similar bills introduced in Congress do not provide for the payment of any percentage of revenue received from the sale of power, in lieu of taxes, to the United States Treasury. Nor do they provide for the payment of any kind of a tax, or anything in lieu of a tax, to any state, county, city, town or school district. Nor do they provide that cities, towns and other political subdivisions which may be purchasers of this power for resale to the public shall pay taxes, or anything in lieu of taxes, to either the federal government or to any state, county, city, town or school district. These properties and all the revenues from these properties are to be tax exempt.

The Tennessee Valley Authority Act does make a political gesture by providing for a very small tax. The Alabama Power Company recently stated that if the T.V.A. were required to pay taxes on the same basis as that company it would have to pay 270 times as much as it did pay in 1935.

I have already stated that the cost of these dams and power plants must be allocated and charged to flood control, navigation, irrigation and power development. Such allocation for power may be 25 per cent of such cost or it may be less than that. There is no provision in this bill that the rates to be charged for such power shall be fair, just and reasonable, or that the board shall undertake to obtain from the sale of power revenues which shall be sufficient to pay any rate of return whatsoever upon the amount allocated to power. In other words, the board may sell the power generated in these plants below the cost thereof or at any price it sees fit to charge.

### *Utilities milked for subsidy*

It is, of course, self-evident that these politically operated systems, exempt from taxation of any kind, subsidized by the federal government as to the cost of construction both of power plants and transmission lines and distribution systems, and without any restraints as to the charges made for electric energy, will afford a condition of competition that cannot be met by the privately owned utilities, which pay in taxes from 15 to 20 per cent of their gross revenue and which are compelled by law and state regulation to charge rates that are fair, just and reasonable, without discrimination, and whose capital investment consists of the entire cost of its power plants and transmission and distribution systems (about $5,000,000,000), and not 55 per cent of their cost, and which are limited to a fair rate of return upon the fair value of their property used and useful in the public service. It is evident that if this bill shall be passed and the taxpayers are adequately "milked," and the money is appropriated for these authorities, that the result will be bankruptcy for many of the privately owned utilities now operating in this great empire and giving efficient service at reasonable rates. Such results not only will be bankruptcy for the corporations but enormous losses, to the 2,000,000 of investors therein—men, women and children, as well as depositors of savings banks and policy-holders of life insurance companies.

Senator Bone's bill (S4178, introduced February 24, 1936) relates to Bonneville and is a little more frank than Senator Norris' bill in that it does not contain any weasel words or humbug about selling the electric energy to privately owned utilities. Under Senator Bone's bill none of the power generated at Bonneville power plant can be sold under any terms or conditions to any privately owned utility or to any industry whatever. It must be sold to states, counties and other political subdivisons of the state, and if they fail to buy it it will not be sold at all.

Visualize, if you can, that great superstate to be created by the Mississippi Valley Authority Act, comprising about one-third of the United States, superimposed upon 23 states in whole or in part. The Mississippi Valley Authority Act provides that the three directors appointed by the President shall undertake to bring about the maximum amount of flood control and irrigation, the maximum benefit of navigation, the maximum generation of electric power, and issue edicts dictating what they may consider the proper use of marginal lands and the proper method of reforestation, and may do and order all things which in their opinion will be for "*the economic and social well-being of the people.*" As under this proposed statute, if valid, the triumvirate appointed by the

President would have power, without any Congressional definition or limitation, to do and dictate whatever the President or the triumvirate might think proper for "*the economic and social well-being*" of their subjects, and the other things just mentioned, there would be created a petty monarchy ruled over by men with autocratic power. No longer would there be within that territory a government by the people. State laws would be subject to the edicts of these potentates. As this bill is the brain child of Senator Norris, this supergovernment should bear his name—*The Norris Empire.*

### *Jobs are legion for Ickes*

I now ring down the curtain on Act II of this National Tragedy and ring it up for Act III. Harold L. Ickes is a man of great versatility. He is Secretary of the Interior and has been presented by the President with some 25 other jobs—bureau, commission and committee jobs. It must be conceded that he is the President's favorite Cabinet officer. Mr. Ickes is a public ownership fanatic. He admits it not only in his writing but also in his donations and distributions of other people's money.

Ever since the passage of the National Industrial Recovery Act Mr. Ickes has been putting out press releases inviting cities and towns to build and operate electric power systems and come to him for the money. And to encourage municipal ownership he has offered to let them have taxpayers' money ample and sufficient for the building of such plants, and that from 30 per cent to 45 per cent should be an out-and-out gift and the remainder a loan on easy terms at 4 per cent interest. Some of them grabbed at the bait, and now he states he has been met with lawsuits, some 59 in number, brought by the pesky utility companies whose property he is seeking to destroy. In his eyes it is quite reprehensible for a utility company to defend its property against unlawful attacks when such attack is being directed by the favorite Cabinet officer. There is said to be such a thing as being drunk with power and that the effect on the intellect is worse than that of alcoholic intoxication.

The Wheeler-Rayburn bill with its death sentence, the government building of numerous dams and power plants and the threat of more dams here and there and everywhere, the financing of municipal ownership with taxpayers' money, discriminatory taxes and the outspoken New Deal antagonism to the existing utilities has had the normal and to be expected effect on the industry, namely, to stop, look and listen before spending any moneys in new plants or in betterments and improvements.

In other words,

**if the industry could have been assured of a square deal from the government the answer of the utilities would have been the spending of several billion dollars during the last two years in plants, improvements and betterments, and many thousands of the unemployed would have had jobs.**

### *Act IV of National Tragedy*

In January, 1935, the legal department of the P.W.A. prepared scores of bills for enactment by the legislatures of the several states. The Administrator, who had several billions of other people's money to spend, sent a dozen or more of these bills to the Governors of the 48 states. Most of such legislatures were then in session. The purpose of some of these bills was to improve the machinery of the state governments so that moneys could be advanced to the states with promptness and dispatch. The purpose of at least three bills was to foster and encourage public ownership and political operation of the electric light and power business.

You are painfully familiar with the Public Utility Act of 1935 (Wheeler-Rayburn bill), its death sentence, its attempt to usurp the functions of the states, its provisions which will put the utility companies to great and useless expense, its attempt to manage and control the activities of practically all operating companies in this country, the necessity for lawsuits to test its legality, the effect it has had in slowing up capital investments and construction; hence I need not make any special reference thereto.

### *Americans a fair people*

For the past three years there has been evolved and developed by the inner circle of the New Deal a plan or plans to hamstring, strangle and destroy all the electric utilities, big and little, in this country, with public ownership and political operation as the ultimate end in view. But we need not be disheartened. We know that demagogues thrive best in times of distress. We know that the American people are honest, fair-minded and intelligent. We know that the American people, now as always heretofore, are opposed to government in business and that they are not likely to accept paternalism, socialism, fascism, communism, Hitlerism or any other ism except Americanism. We know and our customers know that the electric service furnished by the utilities is the best in the world and that our customers get more real value for their dollars paid to the utilities than they get for any other dollars paid for any other commodity or service.

Most of the states have efficient regulatory commissions and when there are any complaints about services or charges the same may be and are readily and efficiently adjusted without expense to the customer. We know that there is in fact no substantial reason for federal interference with or regulation of the utilities. We know that the value of the property of the utilities which is used and useful in the public service exceeds the sum of $12,000,000,000 and that such property is in fact owned by the public, as it is owned by several million persons who have invested their savings therein, and as well by savings banks and life insurance companies which have many million depositors and policy-holders. And the utilities pay excessive and discriminatory taxes to the amount of about $300,000,000 per year.

### *Take the ball from the demagogue*

In the past the utility executives have felt that their sole function was to build power plants, transmission lines and distribution systems and to sell electric energy and give the best possible service at reasonable rates. Now it is apparent that they have another job. They must keep the public fully informed about the things I have mentioned and about all other matters in which the public may be interested and which have any relation to the utility business. They must do this frankly, accurately, fairly, courageously and frequently—in fact, almost continuously. If they do, the demagogues will be compelled to hunt for some other political football.

# National Program of Eyesight Saving

## Wholehearted Co-operation Tendered by the National Society for Prevention of Blindness — Sight-Saving Classes Commended

By LEWIS H. CARRIS*

Managing Director National Society for the Prevention of Blindness, New York

YOU are doing an important piece of work in dramatizing through advertisements in newspapers and on billboards the importance of good eyesight in everyday living. The electric light industry has played an important rôle in making people in all walks of life aware of the part that efficient vision plays in almost every undertaking. Proper lighting contributes in no small measure to eye efficiency, eye comfort and the prevention of accidents. Your message must necessarily go to those who see. It cannot affect the 114,000 people in this country who live in darkness, nor can it alone save from the blindness those hundred thousand more who may lose their vision.

Development of sight-saving classes, a form of specialized education for children with sight so defective or so impaired that they would not profit from educational material provided for normally seeing children, has markedly reduced the numbers of misfit children, both in schools for the blind, where they did not belong, and in the regular grades in the public schools, where they could not have been adjusted to the visual demands. In 1913 two sight-saving classes were opened for the benefit of visually handicapped, seeing children; today nearly 500 classes are giving partially sighted children opportunities for education equivalent to those given normally seeing children, without the physical hazard of further deterioration of their sight, and without the psychological hazard of unfair competition. We feel that the value of specialized education has been recognized, in that sight-saving classes continued to increase in number even at a time when other educational budgets were being cut; still, only a tenth of the children needing this type of educational assistance are receiving it.

*Abstract of E.E.I. convention paper.

Early in the work for proper education of the partially sighted child we realize the importance of optimum seeing conditions for every child. Lighting of classrooms, arrangement of seats, improvement of textbook typography, consideration of posture as it affects eye conditions have also been considered. Inspection of the eyes of school children for the purpose of screening out those in need of further eye examination—both for pathological conditions and for refractive errors—and the visual acuity test for the preschool child have been urged to good purpose.

In your efforts to make sight more efficient through better lighting, you assume the responsibility that falls upon every agency or organization dedicated to public service. In rendering the very important task of providing illumination for schoolrooms, office desks and homes, bear in mind that this is but one of the aspects of seeing. The efforts of bacteriologists, chemists, engineers, physicians, educators, social workers, health agencies, eugenists, all play a part in preventing blindness.

### *Sight saving part of large program*

The National Society's function is to procure such scientific knowledge concerning the prevention of blindness and the conservation of vision as is susceptible of sociologic interpretation, and to promote such social action as will prevent ocular difficulties whenever possible and provide necessary care when ocular troubles exist. Ours is the duty to point the way, to sound the warning.

The National Society is a lay organization, supported entirely by voluntary contributions from the general public. Naturally, an organization established and maintained for philanthropic service cannot become a partner in any commercial venture. Yet we stand ready on every occasion, as we have done in the past, to enter into consultation with local sight-saving councils and Better Light-Better Sight movements in planning a real program of saving sight. We offer our help and our co-operation to all who assume the responsibility of keeping from blindness those who, unless great efforts are expended and real service given, may one day face absolute darkness.

In your local campaigns you are stressing better light for better sight. But, as members of society, you have the greater responsibility of lending your support to all—agencies or individuals—who are directly or indirectly interested in the prevention of blindness and the conservation of vision.

# The Cost of Electric Service

## Service Non-Monopolistic and Variegated, Costs Not Formulable—Revenue Recovery After Reduction Frequently Delayed

**BY N. R. GIBSON***
Vice-President Buffalo, Niagara & Eastern Power Corporation

IN THE beginning the electric utilities furnished service to customers using lighting only. There was, therefore, a very restricted demand for electricity confined to a high peak load during the evening hours. For over three-quarters of the day there was practically no load at all. Since the total cost incurred in conducting the business had to be borne by those using the facilities for a few hours a day, and since this use was only about one-quarter of the energy the plant and distribution system were capable of supplying, the result was a high cost per kilowatt-hour. The unit cost per kilowatt-hour was, of course, much higher than we are now accustomed to and much higher than it would have been if the plant could have been loaded for a greater proportion of the time. Despite this condition, the value of electricity for lighting service was so great that its use continued to grow and it successfully competed with other forms of lighting.

### *Power load competitive*

With plant capacity already installed and fixed charges thereon already incurred, the problem of reducing the unit cost per kilowatt-hour was clearly one of making this capacity work for a greater proportion of the time. The obvious thing to do to reduce unit costs, particularly the costs related to fixed charges, such as interest, depreciation and taxes, was to take on a power load. However, the power requirement of industry was then being supplied by steam and gas engines and by water power where available. It was necessary to demonstrate to these industrial establishments, first, that electricity from central plants could be supplied to them without undue interruption and, second, that the cost would be no more than the cost of their existing supply.

When the electric utilities began to compete with isolated industrial power plants, they had to make rates which would be competitive and therefore attractive. While the power load would not fall entirely outside the evening lighting peak in all cases, it would make the plant capacity work more hours per day, increase volume of output very materially and reduce the unit cost per kilowatt-hour. It was found impossible to compete successfully with these isolated industrial power plants and to make a rate which would secure that business, if the rate was to be based upon the existing average cost per kilowatt-hour of the electric utility then serving only a lighting load. It was realized clearly, however, that the additional cost to the electric utility of taking on the power load would be much less per kilowatt-hour than the existing average cost. It was found that a rate could be made which would be competitive, would secure a substantial power load, and would, at the same time, pay all of the additional cost of taking on this load and something in addition thereto.

In the same manner and with the same principles in mind, considerable business was developed in the supply of electricity to railways. This class of load had a particularly good load factor, operating many hours per day. Again a rate could be made which would secure this business, pay all of the additional costs of supplying the electricity to the railways and in addition contribute toward the other expenses of the electric utility.

In large measure, the power loads and the railway business thus obtained could not have been secured except upon the additional cost basis. When this load had been added the unit cost of generating and distributing electricity was materially reduced because of better load factor and larger volume of output and sales. Net earnings were increased and lighting rates could be and were reduced.

### *Attractive new business*

The principle involved is an old one, recognized and used in industrial enterprises, generally, that a class of business is attractive at rates which will pay all of the direct costs incurred in the business and contribute something to the general expense. This principle has been demonstrated as economically sound. It complies, of course, with no arbitrary rule of determining the cost of service. It must depend upon judgment of those conducting the enterprises, a thorough knowledge of the competitive situation and last but not least, it must be based upon courage, initiative and good salesmanship.

Cost of service is a most disappointing will-o-the-wisp when an attempt is made to fix that cost for the various types and classes of service furnished. Cost of service to any one customer or to any class of customers has about as many different values as there are theorists trying to find them. The electric utility industry has grown so fast, the progress of the art has been so rapid and the relationship of one class of service to the other has changed so often that an analysis of cost is out of date by the time it has been completed and at best can only be used to guide

*Abstract of E.E.I. convention paper.

the judgment of the management in fixing prices which will support the business as a whole.

The costs of operation of an electric utility do not vary with any single factor. The amount of electricity generated and sold, the number of customers served, the character of the industries in the territory and other elements all affect costs. There are many items of expense which are not directly affected by either output or number of customers, but are controlled almost entirely by the capacity of the plant and system required. There are certain very large elements of cost which are general for the entire business, necessary for the conduct of the business but chargeable directly to no particular class of customers or class of service. These general expenses cannot be divided in the electric utility business any more than they can be divided in any other industry. They constitute a problem in the apportionment of the total cost to various classes of service about which there is great argument among economists, accountants and others. Much depends in the approach to the problem, upon the views and sometimes the prejudices of the analyst.

### *Allocation is the problem*

There is no particular difficulty in ascertaining the amount of money required to purchase and install one kilowatt in generating plant capacity. Nor is there much difficulty in determining what fixed charges will be incurred in the way of taxes, depreciation and interest. The cost of generating the kilowatt-hour may be determined with fair accuracy, knowing the volume of the output, load factor and the operating conditions. As soon, however, as an attempt is made to allocate these costs among various classes of customers with varying demands and different characteristics of use and changing in their relationship almost daily, then the difficulty begins. Class demands do not occur at the same time but at various times during the day. The demands of the several classes change materially with the seasons. One kilowatt of demand by a class of customers does not mean that one kilowatt of plant capacity is required for that class. It may require one or considerably less than one kilowatt of plant capacity to serve that class, depending upon the diversity of the demands of the several classes served. Large industrial loads may be taken on with no increase in plant capacity at all. They may mean simply the filling up of valleys in the load curve. The cost of plant capacity and hence the cost of fixed charges for a certain class of service will vary over a wide range under varying conditions. Of course, no class of customers, or no class of service should be a burden upon other classes.

While these things are recognized as sound principles in the rational development of an electrical system from the engineering, economic or accounting standpont, there is in addition a legal requirement which cannot be overlooked, namely, that there shall be no unjust discrimination as between customers. What this means is simply that like service furnished to like customers under like conditions must be furnished at like rates. It should not mean that the percentage of profit in all classes of service should be the same.

It has been stated that reduction in the price of electric service for domestic purposes always produces increased consumption and immediate restoration of revenue. The unqualified acceptance of this statement is certainly not warranted by the facts. That it has usually been possible to sell more electricity when reductions in price have been made in the past should not be taken as conclusive evidence that it has always been possible to do so or that further reductions will produce a like effect in the future. Quantitative analysis must always be made to determine the extent of the prospective market in which the sales are to be made. This analysis will necessarily include a study of the relative price levels of gas, oil, coal and electricity, the competition to be encountered, the number of appliances already in use, and the purchasing power of the consumers.

A review of the load curves for various communities preceding and following rate reductions does not disclose a uniform law governing the relationship between price and consumption. Records of certain companies show that the immediate loss of revenue per residential customer, resulting from rate reductions, has varied from a negligible amount to a large percentage of the revenue obtained before the rates were reduced.

It is in the interest of every electric light and power company to foster and promote lower rates for electricity as rapidly as the economics of the business will permit. Rate reductions, however, must proceed in harmony with the progress of sales programs and with the development of new uses to bring about corresponding increases in the household use of electricity. The time element is an important consideration, for it takes time to develop and obtain acceptance of new appliances, to educate customers in new or further uses for electricity, and for them to acquire the necessary wiring and appliances. Even so, there are factors which place a limit on the extent to which low rates can economically be made available.

### *Potential market in heavy appliances*

The potential market for increasing the consumption in the home lies almost entirely in the fields of refrigeration, cooking, water heating and house heating. The factors controlling the acquisition of this market are purely economic.

There has been a great deal of discussion about ways and means of reducing the cost of distribution of electricity. The elements of which transmission and distribution systems are composed, such as lines, transformers, substations and the like, are the result of many years of study and experience. Progress is continually being made but it does not now appear that any revolutionary discoveries are in sight which will materially reduce distribution costs. On the contrary, the exacting demands for continuity of service, constant voltage, the increasing demands on the part of municipalities that distributing lines be put underground or that they be moved in advance of municipal building activities are more likely to increase distribution costs.

The greatest hope for lower cost of electricity to all classes of customers lies in increased use of existing facilities. All those items of cost which depend upon number of customers, such as meters, service connections and to a large extent distribution lines, are more or less fixed and only increased consumption by these customers will materially reduce such costs. Better load factor brought about by better diversity of power loads will materially reduce the fixed charges per unit made necessary by the capacity required to serve them. In new and more diversified use of existing investment lies the chief hope for lower costs and still lower rates.

# Rate Reductions

## Some Record Figures to Show How Well the Industry Has Served—An Analysis of False Conclusions on Rates—Practical Aspects of Rate Making

**By W. G. VINCENT***
Vice-President Pacific Gas & Electric Company

THE entire history of the development of the electrical industry has been observed by many persons who are still actively at work. Among the most notable of its achievements has been the continuous downward trend of the charges made for electric service. From an analysis just completed, I find that the average bill, weighted according to population, for domestic service for 25, 100 and 250 kw.-hr. per month in the 51 cities of the United States used by the United States Department of Labor in compiling its cost of living data was as of January 1 of each year:

| | Average Bill for | | |
|---|---|---|---|
| | 25 Kw.-Hr. | 100 Kw.-Hr. | 250 Kw.-Hr. |
| 1906..... | $2.77 | $10.29 | $24.87 |
| 1911..... | 2.43 | 8.66 | 21.34 |
| 1916..... | 2.08 | 6.93 | 16.28 |
| 1921..... | 1.99 | 6.31 | 14.61 |
| 1926..... | 1.80 | 5.58 | 12.73 |
| 1931..... | 1.65 | 4.94 | 10.60 |
| 1936..... | 1.50 | 4.17 | 7.79 |

Beginning with the year 1926 we have a record of the sales and revenues of the electrical industry in the United States divided into seven classifications. Had the 1926 average rate for each class of service still been in effect from 1927 to 1935, inclusive, the electricity used during that period would have cost the public $2,021,839,000 more than was actually paid. That the public was not required to pay this larger amount for its electric service was due to two factors, namely, rate reductions made since 1926, and the fact that practically all electric schedules are so designed that increased use automatically receives a lower rate.

The amount of $2,021,839,000 to which I have referred is made up for the different classifications of service as follows:

| | |
|---|---|
| Domestic | $1,204,864,000 |
| Commercial light and power, small | 447,595,000 |
| Commercial light and power, large | 313,718,000 |
| All other classes | 55,662,000 |
| | $2,021,839,000 |

The amount accruing to domestic users, of $1,204,864,000, is made up of savings due to rate reductions approximating $900,000,000 and savings due to the added use being billed on the lower blocks of the rate schedules approximating $305,000,000.

This is only a part of the story. The extent to which the public has benefited cannot be measured by the dollars saved through reduced charges. The comforts enjoyed, the conveniences made available, the relief from manual labor, and the significance of all these in the economic and cultural progress of the country are essentially a part of the picture.

### *Six cents a day*

Let us pause for a moment and examine just what, on the average, this domestic electric bill amounts to, and consider what the purchaser receives in return for the money that he pays the utility company each month. Let us examine this domestic bill about which so much sleep is lost by the politician to try to find out the cause of all the shouting.

There are in this country some 21,000,000 domestic electric customers. (If you cannot find the cause of all the shouting in this statement, I believe you will search for it in vain in what is to follow.) These 21,000,000 customers last year used on the average 673 kw.-hr., for which they paid $33.84, but, as is well known, this average is derived from a large number of small users and a smaller number of large users. In fact, about two-thirds of this entire number, or some 14,000,000 customers, none of whom used over 600 kw.-hr. a year, used on an average about 300 kw.-hr. a year, or 25 kw.-hr. a month.

The Federal Power Commission in its Rate Series No. 3 found the average bill for the entire country for a domestic use of 25 kw.-hr. was $1.79, or approximately 6 cents a day. This use ordinarily covers lighting and operation of some small appliances, such as toasters, vacuum cleaners, electric clocks, radios, bell ringing transformers, etc., so when we consider the amount of the charge, which is about equal to the tax on a package of cigarettes, slightly in excess of the cost of a package of chewing gum, or about equal to the cost of a morning and evening paper, in relation to the value of the service rendered to the customer, it is difficult to see how any one could consider the charge unreasonably high or in any way burdensome. Even if we consider the average bill of *all* domestic customers, including the large consumers who have electric ranges, refrigerators, washing machines, water heaters, several radios and all the multitude of electric appliances which add innumerable conveniences to the modern home, we will find that the charge is not unreasonably high. Considering that on the average the domestic bill for all 21,000,000 customers last year averaged about 9 cents a day, or less than the cost of a shoe shine, the

*Abstract of E.E.I. convention paper.

cost of laundering a shirt, the cost of a trip downtown and back, whether by street car or family automobile, it is impossible to see how any one could question the fact that the domestic customer is getting his money's worth in full measure when he pays his electric bill.

Let us pass from the average bill to the total national bill for domestic electric service to see how that compares with certain expenditures made by the public for both necessities and luxuries.

The total domestic electric bill of the nation in 1935 was about $702,682,000, just about equal to the amount the American women spend in beauty shops, less than was spent in barber shops, less than the public spends for candy and about one-half the amount it spends to see moving pictures.

There have been some reductions made during the last few years which were not justified by the economic conditions, but were the result of political pressure. Some of these may work out; in other cases, the former rates sooner or later will have to be restored, at least in part, or the investors will continue to sacrifice the return to which they are entitled.

### *Rate generalizations unjustified*

The critics of the industry have told us repeatedly during recent years that if we would reduce our rates, we would increase our sales and profits. This has been the favored line of criticism for those outside the industry, and sometimes even those within the industry have presented the same argument, reaching this conclusion by a process of inductive reasoning—that is to say, by assuming that the accomplishments in certain special localities could be secured in other localities, even though conditions are quite dissimilar. There are any number of specific instances which prove conclusively that any such generalization is absolutely unjustified. It is true that where a high use per consumer has been developed a relatively low rate will usually be found in effect, but this is because of the fact that conditions in that particular locality made the development of a high use per consumer possible. The two conditions were interrelated.

There are cases where a relatively small decrease in the rate when accompanied by suitable merchandising activity will produce a large increase in volume and an increase in gross revenue and even in net revenue. Because of success in a few instances, the industry's critics have jumped to the conclusion that the same thing could be done indiscriminately. They speak of a "hump" to be got over and of "breaking the log jam" as if all that were needed were a rate reduction to unloose such a flood of additional use that not only would the gross revenue be promptly restored, but that even the net position might be at least as good as before.

### *Reductions made hopefully*

This problem is not new to you. It is as old as the industry. The management has constantly sought ways of increasing use and in favorable situations has not hesitated to make rate reductions in anticipation—in fact, sometimes even upon the mere hope—of increased use in sufficient volume to overcome the reduction, both as to gross and net, but it is obvious that such experimenting should never be done rashly, never by taking for granted anything which could be resolved in advance.

We must not, however, jump to the conclusion that a rate reduction in any case will pay for itself. The circumstances of each case must be carefully considered. In the domestic and especially in the heating and cooking field a most important consideration is the price at which competitive fuels are available. Unless the contemplated rate reduction can be made sufficient to compete with these fuels, after due allowance for the incidental advantages of electricity, it may be futile and little or no stimulation result. This is very likely to be the case in cities supplied with natural gas for domestic use.

The statement that lower rates will increase sales is susceptible of at least two interpretations. I believe it is generally intended to imply that the present rates are such that customers feel constrained in the freedom with which they make use of their present facilities for using service and if rates were lower this restriction would be removed. It is with this implication that I take issue. It may have been true many years ago, but I can find no evidence that it is so today. On the contrary, the record of how the public spent its money during the dark days of the depression, to which I have already referred, is conclusive evidence that electric rates, and I am speaking of domestic rates, are not burdensome or restrictive on the use of our service.

The other interpretation is, that if rates were reduced the public would be encouraged to use electric service for other purposes—that is to say, that more people would purchase and use refrigerators, ranges, heaters, washing machines, etc. With this interpretation I agree to a certain extent, a rate reduction is a good selling point for appliances and equipment and certainly when a rate reduction is made the sales department should carry on an intensive campaign to try to recoup from John Smith not only the reduction which has been made to him but that made to Sam Brown. As a matter of fact, if John Smith has need of an electric refrigerator and has not bought one, the deterring factor has been his inability to purchase the refrigerator and not the added cost of the energy it would use in its operation.

If the earnings of a utility and its future prospects justify a general reduction of its rates, all well and good, a reduction should be made, and there is nothing more gratifying to the responsible executives of a utilty than to be able to announce a rate reduction, but to make a rate reduction to all its customers merely in the hope that the John Smiths will buy refrigerators and other equipment in sufficient volume to offset the reductions made to all other customers is neither fair to the John Smiths nor sound business.

### *Summary*

We may summarize the past and prospective future trend of electric rates somewhat as follows:

1. The earliest electric rates were designed to secure business which would be profitable.

2. The extension of service to other uses was generally attended by lower level of rates than applied to existing service.

3. The expansion of use in any class of service required lower rates than applied to existing use.

4. There has been incessant pressure to equalize rates by reduction to a common level of the lower schedules.

5. Regulation has tended toward effecting such an equalization, while economic influences have generally tended toward reductions in schedules that would expand sales.

6. There is every indication that the process which has been going on for fifty years will continue, unless interfered with by influences beyond the control of the industry and outside of the sphere of economics.

# Relations in Rural Electrification

## What R.E.A. Has Done and Now Plans — The Attitude of Utilities and Reasons for It — All Encourage Growth of Farm Use

By W. W. FREEMAN*
Vice-President Columbia Gas & Electric Corporation

DURING the present session of Congress it became evident that the federal Administration desired the passage of legislation to give the Rural Electrification Administration definitely outlined powers for a period of years. Bills that were substantially alike were introduced in the Senate and the House by Messrs. Norris and Rayburn. The Senate bill was promptly passed by the Senate without the granting of hearing, but the House bill was considerably amended after several days' hearings before the interstate commerce committee. The conference committee of the Senate and House arrived at unanimous agreement and recommended a modified bill, which was passed and approved by the President, and Mr. Cooke was reappointed administrator.

Upon signing the act the President sent a supplementary estimate to Congress calling for an appropriation of $1,460,000 for administration of the measure during the first fiscal year.

### *Committee job completed*

Since this serves to bring to a close the period of study and discussion between the industry and the Administration as to suggested plans of procedure, the industry committee has been relieved, with thanks, by Mr. Cooke and has ceased to function.

Reports have been issued by the Rural Electrification Administration in the form of releases at various intervals covering approvals of loans and allotments. The latest such release, No. 70, under date of May 13, 1936 (about one year from establishment of R.E.A.), after reporting sixteen additional allotments, states as follows:

> With these allotments R.E.A. has lent or earmaked a total of $12,108,412 to construct nearly 11,000 miles of rural power lines serving over 40,000 customers who have never before had central-station electric service. The funds are distributed among 71 specific projects in 27 states, from coast to coast and from Canada to the Gulf.

It appears from the above figures that the average cost of line, including transformers, is $1,100 per mile. The average number of consumers served per mile of line is 3.63—farm or rural consumers.

The loan contracts to date are understood to be for a twenty-year term with interest at 3 per cent per annum and are payable on an amortization basis of monthly payments, which, after the first year, during which interest only will be required, amount to approximately $5.75 per month for each $1,000 borrowed.

It is understood that the projects for which funds have been "earmarked" have been only tentatively approved, subject to the furnishing of further information or verification, and that final approval of the administrator is in abeyance in the meantime. Also, it is understood, with regard to the projects for which loans have been contracted or definitely authorized, that the actual supplying of the funds in each case is dependent upon verification of the fulfillment of the various stages of progress as provided for in the contract.

That the administrator has exercised deliberation and caution in the investigation of applications for loans and in the negotiation and drafting of contracts is indicated by comparison of the following official figures. Mr. Cooke reported on March 14, 1936, on interstate and foreign commerce at hearing before the House committee that

> the present Rural Electrification Administration had applications for loans for rural electric line construction totaling approximately $93,000,000.

### *Plenty appropriated, but only $250,000 has been spent*

He also reported that the allotment of funds at that date, covering a total of 55 projects, amounted to $9,077,512 and that there were included in said amount 27 projects for which loan contracts had been made totaling $5,000,012. With regard, however, to funds actually advanced to the projects, Mr. Cooke reported to the committee on March 13, 1936, as follows:

> It is a very small amount, a matter of, I should say at most, a couple of hundred thousand dollars.

Between the date of the hearings in March and the report of May 13 the combined loans and allotments increased to $12,108,412. An article in *Business Week* of May 16 states:

> Only about $250,000 has actually been spent so far.

A very recently issued pamphlet of the Administration, entitled "R.E.A.

*Abstract of E.E.I. convention paper.

Electric Service—At a Price the Farmer Can Afford," contains the following summation of the R.E.A. program:

R.E.A. does not give anything away. It is a financing organization that lends money on equal terms to all agencies in a position to carry through a power-line construction project rapidly and adequately. The agencies which build the lines will own them, subject in most instances to liens pending the payment of the loans. The agency operating a line will as a rule buy power at wholesale from a generating company, and resell the current to the consumers connected to the new line. The difference between wholesale and retail rates will pay for operating the lines, preparing bills, keeping lines in repair, insurance, taxes, interest and repayment of the loan. There will be a definite provision for the repayment of every dollar, and the government will have reasonable security covering 100 per cent of the funds advanced on projects.

Under suitable conditions, R.E.A. lends the entire cost of building the lines. Loans are made on favorable terms. Borrowers are given 20 years to pay back the loans and the interest rate is very low—only 3 per cent. Security for the loans is usually the line itself and its revenues. No farmer is required to mortgage his property. No member of a co-operative is liable for debts of another member. There is no liability whatever on the part of the individual consumer except to pay for the current he uses.

There are many items of expense growing out of the construction and operation of a power line. These become very burdensome unless they are shared by many consumers. In view of this fact R.E.A. cannot help bring electricity to a single isolated farm or small group of farms.

It is impossible to make hard-and-fast standards which all projects must meet in order to get R.E.A. approval. The area to be served by the new lines should be more or less concentrated and compact. To be economically successful, a project should have at least 25 miles of line or serve at the minimum about 75 customers. Shorter extensions may be approved, if they are made part of an existing, self-supporting line.

The lines should be planned to bring power to every possible consumer in the area. Rural electrification in the past has too often been brought only to those consumers who were close to existing lines or who were large users of power. The other farmers in the region were left to struggle along without electricity. R.E.A. is determined to include the "skimmed milk" with the "cream."

In many ways the co-operative method is ideal for electrical distribution. More and more farmers are learning the benefits of economic organization and are buying and selling through co-operatives. Their effectiveness is creating new confidence in this type of enterprise. Electric service co-operatives, too, have operated successfully in this country for years.

The development section of R.E.A. will advise co-operatives regarding methods of organization and operation.

R.E.A. realizes that most of the electric light and power industry in the United States is operated by private interests. The private power and light companies are being encouraged by R.E.A. to co-operate in the program of electrifying rural regions.

If you have a private utility near you, which you have not consulted, do so. We suggest you see its local manager and find out whether the company is able to help you. The company may be in a position to finance its own extensions, as many have done in the past year. If it cannot finance extensions to your neighborhood, R.E.A. is quite willing to lend money to the company if it offers reasonable security and reasonable assurance of a successful project.

The foregoing may serve to give a fairly complete understanding of the activities of R.E.A. to date and the authority and policies under which operations are to be conducted during the ensuing ten years.

### *Loans to cover cost of wiring, appliances and plumbing*

The sum of $40,000,000 which may be appropriated annually by Congress for the lending of funds by R.E.A. is to cover both the cost of rural lines and of wiring, electric appliances and plumbing on the premises of consumers. It is estimated that the cost of wiring and appliances may about equal the cost of the line extensions. Therefore, if the prospective consumers should avail themselves generally of the loan privileges for wiring and appliances, the available funds for the building of lines will be $20,000,000 annually. This would provide less than 20,000 miles of rural lines annually, and the number of consumers on said lines, based upon approved projects to date, would be about 75,000 annually, assuming that sufficient projects are developed to utilize all of the available funds.

An outstanding opinion of the administrator that is of particular interest to our industry is that rural line projects can be undertaken extensively on a self-supporting and self-liquidating basis where the prospective consumers average less than four per mile and the individual projects may be as small as 25 miles of lines, with an average of about 100 miles. The above averages are derived from the first 70 projects approved by the administrator and it is indicated by him that as the number of projects throughout the country increases, the average of prospective consumers per mile of line may be less rather than more.

It is clear that the industry, in its extensive experience in rural and farm service, has found it impossible to realize anything like the estimated results upon which the R.E.A. program is based. In fact, it has been the experience of the companies of the industry that rural service of such density, or even considerably greater, can only be undertaken by companies as promotional efforts in such limited degree as they can afford to promote and carry in connection with their general operations.

The administrator insists that past standards should be largely ignored in the light of the greatly changed conditions to be rapidly brought about through the R.E.A. program.

Now that the policies and intentions of R.E.A. are known, it is evident that what the industry must regard from its own experience as an exceedingly optimistic experiment is being undertaken by the federal government without any admitted doubts of assured success. The industry has been charged with undue caution in the preservation of its capital resources and current earnings in delaying extension of its service into the less remunerative rural and farm areas. R.E.A. is now undertaking to demonstrate that fair earnings from a much more rapid extension of such service may be more immediate and assured than the industry believes to be possible. The result of this experiment will determine whether or not the government will be able to recover the money represented by its "self-liquidating" loans.

### *Proud of past rural efforts, industry awaits results hopefully*

The industry for the present has no alternative but to await the outcome and realize that it will be called upon to pay its share of whatever tax burden is initially and finally assessed.

The public utility industry is sincerely proud of its past record with regard to the promotion of rural electrification, notwithstanding unwarranted political attacks and criticisms, including misleading and largely irrelevant comparisons with conditions in other countries of the world. Certainly the industry favors the most rapid extension and broadest possible utilization of electricity throughout the rural and farm areas of the country, consistent with sound financial consideration.

The companies of the industry will continue to extend their rural and farm service as rapidly as is believed to be consistent with their obligations to all of their consumers, present and prospective. It will not be surprising if the operations of the Rural Electrification Administration serve in many ways to confirm the soundness of the policies pursued by the industry and supplement its activities in furthering the extensions of rural electrification.

# Utility Accounting Practice

## Purposes Outlined — Development of Existing Systems — Pro and Con of Retirement and Depreciation Accounting — New Proposal

By LUTHER R. NASH*
Vice-President
Stone & Webster Engineering Corporation

UTILITY accounting differs materially from that required for other business, particularly in the prominence of its fixed capital and the relative unimportance of its inventories. Furthermore, under regulation, utilities have accepted certain special restrictions, such as definition of the character and scope of operations and the property devoted thereto, and limitations of income from which the wages of capital are paid. Nevertheless, the basic purposes of all accounting procedure, regardless of the character of business involved, are similar, including the recording of the receipt and expenditure of money. The utilities in which we are interested receive money mainly from two sources, investors and customers. Investors are concerned primarily with the prudent use of their funds, an adequate return thereon, and their repayment if or when due. Customers are concerned that their revenues are used efficiently to provide the service which they may demand at any time and to keep in good operating condition the property through which this service is furnished.

Accounting records should trace in suitable detail all these funds from their receipt to their disbursement. Where long term expenditures are made for property, the records relating thereto should continue so long as the property survives. To the extent that expenditures made for property or services are represented by money, the accounts relating thereto should in general be set up and maintained to reflect actual cost to the accounting company. That it never has been intended that such records should represent value is evidenced by the published views of the outstanding authorities on this subject. Value is a fluctuating and elusive thing based on judgment rather than demonstrable facts. Books of account should deal with facts. These facts include not only the matters already referred to but also records of less permanent property such as supplies and merchandise, and such current transactions as accounts receivable and payable. Most of these records are well standardized and not controversial.

*Abstract of E.E.I. convention paper.

### *Three interested parties*

Utility accounting is of particular interest to three distinct parties: management, regulatory authorities and investors. Management has a continuing interest in the results of the day by day operation of its properties as disclosed by accounting and statistical records, and has a direct responsibility to investors and customers for prudent and efficient operation.

Regulatory authorities make use of accounting records primarily for rate regulation and security issues. Such use is intermittent rather than continuous. The approval of security issues calls for a careful study of capital assets and liabilities at the time of the issue or changes therein since a previously approved issue. Rate regulation requires knowledge of capital investment, revenues, expenses, taxes and other charges for permanent upkeep of property which are disclosed by the accounts of the period under review. But regulation also needs other information which cannot be secured from accounting or statistical records. Such supplementary information calls for inquiry into business and economic conditions, character and condition of the property, its value as distinct from its cost as evidenced by price levels or trends, future business prospects, and possible effects of changes in rate forms and levels.

Investors are primarily interested in periodical statements of distributable income, accumulated reserves and surplus and their relation to their own specific investments. Such interest is ordinarily intermittent rather than continuous.

It should be clear that the requirements are in the order stated; that management with its continuous supervision and obligation needs greater refinement than either of the other parties. Logically, therefore, a system of accounts suitable for managerial purposes should meet all the requirements of regulation and provide more detail than is needed by investors. It also follows that any needed modification or modernization of an existing system of accounts should have most careful as well as initial attention by the utilities which have the most direct and continuing interest therein.

### *Retirement vs. depreciation accounting*

It has been stated that the purpose of accounting is to record financial facts. While most accounting entries are records of facts, certain exceptions are commonly recognized. Equalization reserves are maintained, based on estimates, to take care of certain irregular charges, but these are commonly cleared or closely checked at annual or other frequent intervals. Certain reserves, however, run for longer periods. Among them may be included retirement reserves of the character

provided for in the Uniform System on the assumption that they are intended to be equalization reserves and not to make more comprehensive provision for retirement liabilities. The judgment basis on which such reserves have been accumulated and the apparent wide differences in the expressions of such judgment have been the subject of criticism.

The proponents of the alternative straight line depreciation accounting method claim that such judgment should be replaced by a factual basis, and they contend that the high degree of possible accuracy embodied in estimates of useful life of utility property affords such a basis. On this assumption they contend that detailed computations by classes or units of property based on such useful life will disclose the extent of annual and accrued depreciation in a form and with a degree of refinement and accuracy most appropriate for accounting records.

*The soundness of this contention rests upon the accuracy with which it is possible to estimate useful lives.* With a background of more than 35 years of intimate engineering, operating and supervisory contacts with public utilities, *the writer is wholly unable to agree with such a contention, nor are any others having a similar background known to agree.* A careful study of useful life estimates embodied in published tables, actual utility experience, allowances of the Bureau of Internal Revenue, decisions of regulatory authorities, and other sources show wide variations which cannot be accounted for by climatic and other local conditions. Some years ago the writer made certain studies of the causes of retirement of utility property in widely separated localities covering periods of twenty or more years. More extended analyses have since been made by the Accounting Committee of the Institute. All these studies indicate that *less than one-fifth of all past retirements were due to physical causes such as wear and tear, rust, decay,* etc., the predominant remainder being due to non-physical causes including obsolescence, inadequacy and supersession.

### *Non-physical causes unpredictable*

The progressive effects of the physical causes of retirement are recognized, and useful life so far as determined thereby can be estimated with reasonable accuracy. Non-physical causes are not similarly progressive nor can their effectiveness be predicted with any approach to accuracy.

The preponderant cause of past retirements has been inadequacy due to the continued rapid growth of electric power properties. The industry as a whole has doubled its investment about every seven years. With the menaces of government competition, rate regulatory policies tending to lower levels of rates and reduced income rapidly mounting and discriminatory taxation, and other discouraging influences, predictions relating to future growth are obviously nothing more than guesses.

The future effects of obsolescence are similarly uncertain. Our most important units of property are power stations. We have made radical improvements in efficiency and increases in size of units. Our engineers now tell us that future opportunities for improved efficiency are relatively small and that further concentration of production capacity is generally unwise. Our long experience with and increasing standardization of other units of property have led to greater ruggedness of construction, serviceability and longer life than the older types now being retired.

### *Telephone reserves criticized as excessive*

Other causes of retirement relate to municipal and other regulations which require placing wires underground, changes in street lines or grades, and other improvements and refinements in service. In view of the rapidly increasing burden of debt of municipalities and other governmental units and the future charges and taxes relating thereto, it may well be questioned if extensive programs of public improvements involving changes in utility property will be continued in future years.

In the light of these and other uncertainties as to non-physical causes of retirements and their predominance it has long been the writer's considered judgment that the best estimates which informed engineers or executives can make of useful life may be subject to plus or minus errors of not less than 50 per cent. If such possible errors exist, *any accounting entries based thereon are obviously not facts and they cannot be supported on that ground.*

It is well known, both from experience and mathematical computations, that straight-line reserves will accumulate over a period of years to very large percentages of total fixed capital. If properties have no growth and salvage value is negligible the reserves will ultimately accumulate to 50 per cent of the investment in depreciable property. Growth such as we have experienced in the past causes a reduction in such percentage of maximum accumulation to something like 35 per cent. No utilities have so far used the straight-line depreciation method long enough to accumulate the maximum reserves which will some time be reached.

This method has been used by telephone companies for more than twenty years and their reserves have steadily increased to an average of about 25 per cent. Such reserves have been subject to increasing scrutiny and criticism by regulatory agencies and the accruals based on detailed estimates of life and elaborate mathematical computations have been repeatedly reduced, arbitrarily or otherwise. Historical records of useful life have not been questioned nor have the mathematical processes based thereon, but it has, nevertheless, been the judgment of the commissions that the resulting reserves were excessive.

Even if practical and legal objections to straight-line depreciation did not exist there are other objections to certain assumptions associated therewith. There is the assumption that property is uniformly consumed in service during its useful life with a correspondingly progressive loss in value. It cannot be too strongly urged that books of account are not intended to record value but rather cost, and that value from time to time does not and cannot be made to conform to any mathematical rules. Value is measured by usefulness rather than age and is determined by economic forces unrelated to time. When a property ceases to be useful and is retired, its value disappears other than for possible salvage.

It may be contended that value decreases as the probable date of retirement approaches. While this may be true, it cannot be reflected in accounting records. That it may not be true is having repeated illustrations relating to power generating units. Many such units installed twenty or more years ago have been thought to be approaching the end of their useful lives, although still in unimpaired physical condition. The availability in recent years of high-pressure steam equipment has made it possible to superpose high-pressure units on existing moderate pressure turbines thereby prolonging their useful life for many years with marked increase in over-all sta-

tion efficiency. This is but one of many possible illustrations of the uncertainties surrounding value.

### *Linear rule ignores decisions*

A study of the recently developed accounting systems which provide for straight-line depreciation accruals indicates that depreciated original cost is a primary objective through which rates for utility service may be reduced. Such an assumption ignores many controlling decisions of the courts that accounting records are not a proper measure of accrued depreciation, but that it must be based upon an examination of the property involved.

In other ways efforts to reduce rates through straight-line depreciation accounting are illusory. Electric power utilities have so far made negligible use of the straight-line method, and the reserves which they have accumulated are far less than the ultimate straight-line accumulation. They are also less in most cases than the accumulations under the sinking fund method. Such reserves do not justify a depreciated rate base. If a utility having moderate reserves under the retirement method were required to change to the straight-line method it would be many years before a complete straight-line reserve would be accumulated. *Until that time arrived it would be inequitable to deduct straight-line depreciation from the value of the property in rate cases.*

The accounting committee of the institute believes that, as a result of its recent studies, it has offered such a system to the industry as a constructive substitute for straight-line depreciation which it has consistently criticized. This program is based on the assumption that retirement provisions can be more accurately determined by reference to the size of the accumulated reserve than by any estimates of annual accruals. Executives of the industry with many years of operating experience have formed fairly definite opinions as to the size of the reserves which their properties should have. They believe that the error in their judgment as to such size is far less than would be their error in estimating useful lives.

Having such procedure in mind, it is obvious that if existing reserves are low the annual accruals thereto should be increased and if they are already adequate no increases are needed and decreases may possibly be appropriate. This conception of a yardstick by which to measure retirement accruals is consistent with many findings of regulatory authorities and courts.

Executives will probably agree that while they can estimate the size of a reserve suitable for the normal requirements of their several properties, they might have some uncertainties as to the extent to which provision should be made for unforseen retirements and contingencies. For such reasons the plan of upper and lower limits recommended by the accounting committee is preferable, the lower limit representing a minimum safe provision for known retirement needs, the upper limit including liberal provision not only for anticipated retirements but also such further allowance for unforeseen contingencies as may be appropriate in each case. Within these stated limits the reserve would be maintained by accruals increasingly liberal when the reserve was near the lower limit, and restricted as the upper limit was approached. These variations in accruals might be in accordance with a definite rule or formula, or might be adjusted within reasonable limits as determined by business growth or lack of it, impending retirement needs, or other pertinent conditions.

### *Proposed retirement plan*

Our program assumes that each utility would file with its regulatory commission a plan of retirement accounting, including the defining of upper and lower limits of the reserve and the methods through which the reserve would be kept within these limits. Most regulatory commissions would probably prefer that the limits in question be fixed as percentages of fixed capital, although there is no particular virtue in this basis where we are seeking only a definition of a boundary from which in most cases the utilities would hope to keep well away. It is suggested that percentages of operating revenues instead of fixed capital would yield percentages more nearly in agreement for properties of different kinds, and that thereunder growing properties, particularly with increasing load factor or saturation, would tend automatically to increase their reserves as their retirement liability increased because of such growth. While ordinarily a utility would build up a single reserve from one retirement expense account, the accounting system would provide for supplementary appropriations from surplus to meet extraordinary retirement requirements. Any such appropriations from surplus, suitably distributed should, of course, be included in the cost of service on which rates are based.

It is intended that the reserve limits originally fixed may be changed at any time upon the initiation of either the utility or the commission. It is recognized that a cessation of growth in the future would require higher percentages of retirement costs in relation to present investment and therefore higher reserve limits. Any commission now favoring the straight line method or its equivalent should offer no objection to an upper zone limit corresponding with an ultimate straight line accumulation, and other commissions not so disposed, should accept, if so requested, an upper limit corresponding to ultimate sinking fund accumulations, normally not much below 25 per cent of fixed capital.

The administration of a program of this kind requires an understanding cooperation between utilities and regulatory bodies with clear recognition that the primary consideration is the size of the reserve rather than the amount or form of current additions thereto. This is in sharp contrast to the straight line depreciation method which defines the rate of accruals and lets the reserve go where it will. The contrast is equally sharp between the complications and expense of depreciation accounting and the simplicity and economy of the proposed retirement program, the latter involving no sacrifice in either accuracy or adequacy of the results.

With such increasing fidelity in the administration of retirement accounting and the gradual building up of the reserves thereunder, there appears to be no valid reason for abandoning the system for some radically different method. What is more appropriate is an evolution, such as is already in evidence, rather than a revolution. It is believed that a substantial proportion of the state regulatory authorities share this opinion. The recommendation of a new uniform system embodying straight line depreciation would not meet with general approval, and if a system were adopted in some states it probably would not be in others. The confusion resulting from such disagreement might parallel that existing prior to the adoption of the present Uniform System when each state prescribed its own independent program.

# Idaho Power Company Is Winner of Coffin Award

**Sparse population, thinly distributed in a long strip of territory, has not prevented high standard of service at low rates — Co-ordination of irrigation and power developments have assured large utilization of available water resources**

**K. M. ROBINSON**
President
Idaho Power Company

### Increased Energy Sales to Major Classes of Consumers

| Class of Service | Energy Sales (Kilowatt-Hours) | | Number of Customers | |
|---|---|---|---|---|
| | 1933 | 1935 | 1933 | 1935 |
| Farm | 17,493,000 | 19,130,000 | 8,838 | 10,407 |
| Domestic | 28,602,000 | 34,080,000 | 25,142 | 29,275 |
| Commercial | 64,286,000 | 78,580,000 | 5,519 | 6,003 |

### Low Density—High Consumption

| | |
|---|---|
| Miles of high-tension transmission lines | 2,278 |
| Miles of distribution lines (less than 11 kv.) | 1,373 |
| Customers of all classes, per mile | 13 |
| Kw.-hr. per customer, farm, 1935 | 1,835 |
| Kw.-hr. per customer, domestic, 1935 | 1,164 |

**From the Citation:**

"This small company, serving a population of only 190,000 with less than 44,000 customers thinly distributed over a strip of territory stretching as far as the distance from Boston to Baltimore, has displayed noteworthy ability and ingenuity in building a power system and an organization admirably suited to the needs and conditions of its territory.

"By engineering skill and well-planned energetic sales effort it has achieved a high standard of electric service at remarkably low rates.

"Serving a population that depends for its economic existence primarily upon the use of water for irrigation, the Idaho Power Company has taken a leading part in the co-ordination of irrigation and power developments in its territory to assure the highest utilization of the available water resources for the over-all benefit of the people of that area. In this it affords an excellent example of the various ways in which electric utility companies can and do contribute to the good of the public they serve."

# Aboriginal Cost

## Neither Cost Nor Value Represented by Proposed Fictitious Entry — Increase in Reserves Also Involved

By H. L. GRUEHN*
Assistant Secretary and Assistant Treasurer
Consolidated Gas, Electric Light & Power Company of Baltimore

WHAT makes the matter of accounting of more than passing interest at this time are the current efforts of regulatory representatives to develop a new body of principles for utility accounting. If these principles are sound and constructive, then not only will managements be helped but also investors, regulatory bodies, and ultimately, the public. If the principles so developed are not sound, then harm will be done. If these principles are positively fallacious, then strenuous efforts are required on our part to correct them before damage is done. Capable accountants of the utility industry feel that certain of the principles now being proposed are definitely wrong in their conception, and will be harmful in their application.

One of the outstanding characteristics of a utility balance sheet is that 80 to 90 per cent of its total assets are represented by the utility's physical property—its so-called fixed capital. Any principle prescribed for the accounting for fixed capital which is unsound is of surpassing importance to the credit of a utility and its ability to raise new capital.

It is another characteristic of typical utility balance sheets that about 50 per cent of the capitalization is in the form of bonds and the remaining 50 per cent is in the form of equity; consequently, any principle which may cast doubt upon a large portion of the dollars representing 80 to 90 per cent of a utility's total assets, thereby casts considerable doubt upon the credit standing of the equity investment. Any harmful principle in respect to fixed capital accounting therefore is of surpassing importance to security holders and to managements, and because the public benefits or is harmed by the soundness of its public utilities, it should likewise be interested in unsound principles.

So it is of interest that an unsound principle is now being proposed in this matter of how to record on our balance sheets a group of assets which constitute 80 to 90 per cent of a typical utility's total assets. This is the principle which is officially called "original cost," and which has been facetiously, though accurately, called the principle of "aboriginal cost."

### *Aboriginal cost a deliberate misstatement*

For the purposes of accounting, this principle is a most amazing doctrine. It proposes that we shall take 80 to 90 per cent of our total assets and deliberately misstate them, and that we shall also deliberately deprive ourselves after the passage of a few years from being able to ascertain exactly what they cost us. It proposes that we shall replace our present balance sheet data with figures which are neither "cost" nor "value." It proposes that we reflect on our books of today what, from the viewpoint of hindsight, is estimated to have been or what should have been done by enterprises in whose mistakes we were never interested or responsible, and for whose successes we had, under our system of economic enterprise, to pay. The principle of "aboriginal cost" proposes that the balance sheet data developed under the accounting principles laid down by Commissions and followed by utilities for twenty-five years be misstated.

Now, what is this principle of "aboriginal cost"?

It says, first, that we determine what was the cost of each item in actual use today to the enterprise which first devoted that item of property to the public service, even though that be one hundred years ago. The aggregate of so-called "original costs" shall be designated "Fixed Capital in Service."

The principle of "aboriginal cost" says, secondly, that the difference between the book value today and the costs to our predecessors shall be placed under a separate heading under some term like "Fixed Capital Acquisition Adjustment Account." So far the principle would only require a meaningless, though costly, segregation of our present fixed capital accounts, with the unfortunate result that some part of our present fixed capital accounts would be designated by a term which of itself seems to cast doubt upon its legitimacy.

But the principle of "aboriginal cost" goes further. The current proposals of the Federal Power Commission and the National Association of Railroad and Utilities Commissioners accountants provide that we ascertain what *should have been* accumulated in our Retirement Reserves *if our predecessors* and we had followed a certain concept of depreciation accounting. It requires that our retirement reserves be increased accordingly, and the difference between what our predecessors and we should have accumulated by following a theory which we do not believe is correct, and what is now in our reserves, shall likewise be added to the so-called "Fixed Capital Acquisition Adjustment Account."

The result of the proposal is that our fixed capital balance sheet values

*Abstract of E.E.I. convention paper.

—which are 80 to 90 per cent of our total assets—be restated; that is to say, they shall be written up in some cases and written down in others. As a result of this restatement, one part of our fixed capital balance sheet figures shall show an estimated amount of what the property cost our predecessors, and the other part shall show the deficit in the past accrued depreciation if retroactively calculated upon a theory which we believe to be unsound, plus or minus the difference between our predecessors' costs and our own costs.

The first part of our fixed capital accounts is to be labeled "Fixed Capital in Service," which is a term generally understood, and retirements of "Fixed Capital in Service" may be made against our retirement reserves. The second part of our fixed capital accounts by its title suggests an item of doubtful value and is to be charged off *as the commissions may direct.* It may be interesting to observe that adequate accounting provision is made for charging this sum off to surplus, if the commissions should so direct. The unusual spectacle is thus presented whereby an accounting classification provides the machinery for handling a confiscation of a part of our property if the commissions should so direct.

### *Amazing character of proposal of "aboriginal cost"*

If we bought a property at a price approved by the Public Service Commission, or at a price fixed by the courts in bankruptcy proceedings, we may feel entitled to believe that its cost is properly to be recorded on our balance sheets as the book value (*i.e.*, "cost") of that purchase, but under the principle of "aboriginal cost" that is not so. If the "original cost" of the property to the selling company or to its predecessors, minus the accruals for depreciation as defined by the proposed classifications, is different from our purchase price then we cannot place the purchase price upon our balance sheet as the book value of our purchase.

If, in what might be considered as an exaggerated example, the land owned by the company being purchased is demonstrably worth several times its "original cost" to the first utility, we must place all excess under a dubious caption called "Fixed Capital Acquisition Adjustment Account." I say this might be considered an exaggerated case, but it has actually happened. The fact that the owners may not have been willing to sell for the cost to a predecessor but were so mercenary as to expect the current market value of their land is apparently quite irrelevant.

Another comment is that "aboriginal cost" operates on the principle of hindsight. It demands to know, for instance, what should have been set aside for depreciation by a predecessor during its career, it if had known of the particular theory of depreciation as outlined by the proposed classifications—and had agreed to it. It overlooks the fact that a predecessor may by costly experiment have had to balance losses on some types of property with gains on the specific property turned over to the purchaser. "Aboriginal cost" is interested only in the "original cost" of the specific property remaining today, and it is not interested in the unfortunate business fact that not every item of property is a "winner" and in the unfortunate business fact that a seller has a right to expect the fair market value of his assets. Parenthetically, it may be observed that the use of average lives based only upon the surviving units of property, for the purpose of calculating what should be in the retirement reserves today, involves a demonstrable mathematical error. The theory of "aboriginal cost" also assumes the knowledge of hindsight in expecting that the original owner knew at the time he installed an item of property just how long it would last.

**C. G. Fichelberger, Union Gas & Electric, Cincinnati; L. G. Tighe, Ohio Edison, Akron**

Still another comment is that the principle of "aboriginal cost" blithely overlooks the inability of present-day owners to determine costs to a predecessor, and it overcomes that difficulty by requiring that such "original costs" be estimated when they cannot be ascertained. Surely, it does not seem proper to require that a large part of 80 to 90 per cent of our total assets be placed upon our books at estimated figures, which are predicated upon the transactions of predecessors in whom we had no interest or no responsibility.

### *Aboriginal cost obliterates chance to find cost to owners*

The principle of "aboriginal cost" overlooks the reality that the predecessor may not have been willing to sell at a figure of "original cost" less depreciation calculated upon what is believed to be an unsound theory, and the application of which additionally involves a mathematically demonstrable error.

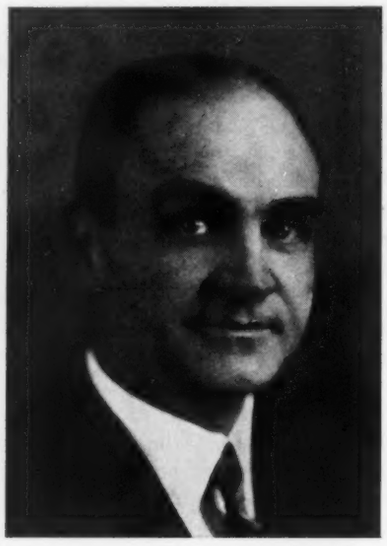
Finally, the principle of "aboriginal cost" quite destroys, after several years of its operation, the ability of a utility to ascertain the costs of its property to the present owners.

Whether by design or by honest error, the proposal of "aboriginal cost" definitely confuses value with cost. The confusion has the unfortunate but important byproducts of requiring a misstatement of the balance sheet values for 80 to 90 per cent of a utility's total assets (and even an honest misstatement is a costly procedure under the acts administered by the Securities and Exchange Commission): of requiring utilities to reflect on their balance sheets neither cost nor value; or requiring them to make a retroactive recording of a hypothetically calculated depreciation reserve; of casting doubt upon the legitimacy of a considerable fraction of our fixed capital accounts; and of destroying the ability of the utility to obtain the cost to the accounting company, which is so essential to investors and managements, as well as to regulatory bodies. The proposal contemplates a confiscatory proceeding in providing that the so-called "Fixed Capital Acquisition Adjustment Account" may, at the direction of commissions, be charged off to surplus. The proposal may even stand guilty of the accusation that a chipping-away of legitimate values may be easier if confusion is introduced in methods of accounting for 80 to 90 per cent of a utility's assets.

# Merchandising Accounting

## Going Beyond the Figures—Variable Company Policies Cited —Courts Have No Agreement—Examples of the Problem

By W. H. SWINNEY*
Controller West Penn Power Company



I SHOULD like us to consider during the few minutes at our disposal five points of interest in connection with the merchandising of appliances, as follows:

1. The extreme variations in company policies toward the attempt to add new business in this manner.

2. The real motive for merchandising appliances and the accountant's responsibility to present a fair picture of results.

3. The processes by which true results of merchandising are obtained, with specific reference to some representative results and comparison with line extension work.

4. A case example of rural line extensions and a look at the record to compare such extensions with the results of selling appliances.

5. Diverse views of regulatory commissions and courts on whether appliance merchandising is a function of the public service company.

Now, as to item (1) the divergence in company policies in selling appliances:

We have witnessed such extreme variations in the policies of different companies, and even in the policies of the same companies under different managements that we are constrained to conclude that there must have been some material deficiency in the accounting and statistical information placed before the different executives, upon which merchandising policies were to be based. On no other hypothesis can the extremes of executive decisions be accounted for, unless it could be said that some of those who fix company policies are more susceptible than others to public attitudes and reactions. Instances are known where the executive of one company expressed his entire willingness to give to customers expensive appliances on the basis of load-building value, while, on the other hand, some companies have discontinued entirely their merchandising activities, apparently out of deference to such considerations as apparently indicated accounting losses from sales, or criticisms from independent dealers who may accuse the utilities of unfair competition in sales prices and high-pressure selling methods. We are familiar with cases where this public reaction has reached a point resulting in the enactment of statutes forbidding public utilities to engage in this business. In other states laws have been passed requiring that separate accounts be kept with burdensome exactitude to show the results of the merchandising activities entirely aside from those of the public service company.

What about point (2), the motive on the part of the utilities in selling appliances?

It is assumed that we may accept the proposition that utilities are engaged in merchandising electric appliances for the purpose on their part of building load, and consequently net income, and for the benefit of customers in providing them with means to the so-called "more abundant life." This promotes the commonweal of both interested parties. It becomes immediately necessary, therefore, to know to what extent a company may engage in this activity and incur apparent *selling losses* from these efforts which do not exceed the benefits from the undertaking. The words "selling losses" may be underscored to emphasize the point that, as accounting records of appliance sales are ordinarily compiled, they tell only one side of the story, because the benefits therefrom are buried in the revenue accounts and are not easily distinguishable for comparative purposes. Not only must the isolation of these revenue accretions be approached with careful thought on the basis of the most trustworthy estimates available (there is no accounting exactitude about it) but the operating expense group of accounts contains some of the most trying problems of apportionment and estimates that may be found in the entire set of accounting routines, particularly where the same employees may be engaged in work of the public service company as well as in that of merchandising.

Point (3) brings us to a consideration of the processes for determining true sales results.

When it is considered that the entire company policy of load building through appliance sales may stand or fall on the results which the accountant is able to show, it becomes necessary to go beyond what is ordinarily considered as bookkeeping and pure financial reports and to consider and report certain statistical facts bearing upon these operations. In the first place, the accounting reports per se must be compiled on a basis that will produce confidence in their use as one of the important factors in the statistics to be developed therefrom. Net income from the appliance operations, whether conducted as a selling activity of the public service company or through a separate corporate organization, forms one of the important links in the chain of special statistical data.

*Abstract of E.E.I. convention paper.

Net income is a dollar accounting result which includes in its development a proper consideration of such items as time and expenses of employees engaged both in selling and in utility service, joint use of offices and display space, motor equipment, etc., especially by companies serving the smaller towns or where the volume of merchandising is not sufficient to require separate organizations. Even with the latter, a point is reached in the higher supervisory positions where joint responsibility is encountered which must be evaluated in dollars and cents for apportionment purposes.

### *Measure of load building*

We encounter an even more nebulous line of demarcation which must be located to identify such services by the selling organization, or by joint employees engaged upon such matters, as soliciting new business, services to customers in performing minor repairs and maintenance of electric appliances, adjustment of complaints in the field, customer contacts, etc. These matters are of value to the utility company and would be carried on regardless of whether merchandising were undertaken.

After the net income (or, as occasionally happens, the net loss) is determined from the accounting records as applicable to the selling activities, it becomes necessary to attempt the determination of the measure of benefits which flow from the placement of these additional load building appliances on the lines. These benefits are reflected in the composite total of domestic or commercial revenues, and special statistical computations are required to bring out and relate these special results of load building to the appliances sold. Where records are kept of the sale of appliances by kinds and by units these sales may be tabulated into groups which will approximately conform to the consumption of power according to some generally acceptable rate classification, for the purpose of determining the probable rate which the customer will pay in using the appliances. A simple but effective classification may be set up consisting of only four groups, which may be described under the following headings:

*Domestic Group A*—Consisting of heavy appliances such as ranges and water heaters which might be expected to increase the customer's load to a point where the proper rate applicable would be the lowest step in rate schedule.

*Domestic Group B*—Consisting of household articles such as refrigerators, ironers, radios and flatirons, the addition of which to the lines might reasonably be expected to add a substantial load, but not to the extent of Group A, and therefore might fall in a rate step somewhat intermediate between the top rate and the lowest step.

*Domestic Group C*—Consisting of the smaller articles, such as washers, cleaners, percolators, toasters, lamps, clocks, etc., which are largely the low consumption group of appliances, the total load related to which might not increase the customer's consumption to a point where it would affect materially his present rate steps.

*Commercial Group*—Consisting of heavy ranges, refrigerators, air-conditioning, ventilating fans, counter appliances, etc., which would place substantial load on the lines and to which commercal schedules would apply in the computation of added load.

Classification as between Group B and Group C might be arranged so as to result in very little differences in current consumption or rates applicable to the two groups; that is, the classification might be set up to develop another type of information, such as motor-driven appliances as distinguished from the heating element or the lighting type.

After the statistics are compiled showing the classes of appliances sold and the number of units added to the lines, use is made of tables showing the estimated annual kilowatt-hour consumption per unit and computations are made of the expected additional kilowatthour sales. The probable rates applicable by classes are determined, and from the total kilowatt-hours added the estimated added annual revenue from appliance sales is computed. Using typical figures computed on that basis for one company for a year, estimated annual revenue was approximately $50,000, which load had been placed on the lines at an immediate and direct cost of $100,000, the latter figure being the net loss from sales operations as disclosed by the accounting statement of operations. Ordinarily this would appear to represent that each dollar of added annual revenue cost $2, but this is not the whole story. In the first place, the service life of the appliances sold is not consumed in the year in which they are sold. In the second place, the expense of selling is incurred only once and that expense has been included in the accounting statement for the year. It becomes necessary therefore to evaluate the unit sold in terms of estimated life, and such estimates are fairly reliable today, as are those relating to the estimated annual kilowatt-hour consumption. We have available now the results of many studies along these lines. On the basis of the example used, the appliances sold would produce over their entire service life a total of $175,000 in revenue, which is a net figure after allowing for such additional items as may not have been included in the accounting statement, such as incremental cost of power consumed by the appliances, carrying charges on the necessary investment to serve them, etc. Deducting from the total revenue of $175,000 the sales loss of $100,000 to place the appliances on the line, a net profit of $75,000 is realized in the transactions.

**George Armbrust, Commonwealth Edison; E. L. Hough, Union Electric Light & Power**

### *An example in rural*

Let us see what results might be expected from the extension of rural lines to connect new customers, but it should be understood that the following figures are representative only within the realm of reasonable estimates and relate to minimum revenues which a utility company requires to warrant the extension of lines under rules and regulations generally recog-

nized in the industry and by regulatory commissions. Assuming the extension of lines on a basis which will produce revenues of 18 per cent per annum on an investment by the utility of $100,000, approximately the following results could be expected on the minimum revenue basis referred to:

| | | |
|---|---|---|
| Investment | | $100,000 |
| Annual revenue | | 18,000 |
| From which should be deducted: | | |
| Carrying charges on the investment | $7,000 | |
| Renewals and retirements or depreciation at 5% | 5,000 | |
| Production of energy on incremental basis, at 2 mills | 800 | |
| Distribution, commercial, general and miscellaneous expense, including meter reading, billing, collecting, servicing, operation and maintenance, at $10 per customer | 10,000 | |
| Taxes at 10% of the revenue | 1,800 | 24,600 |
| Net deficit from revenue | | $6,600 |

The latter figure might be said to represent the deficiency below a fair return on the $100,000 investment, inasmuch as an item of $7,000 was included among the costs to cover that factor. The cost of the money to the utility used in building the lines is no less real than other costs.

### *Revenues from extensions*

Perhaps a further word of interpolation is warranted in regard to the use in the comparisons of the full service life of appliances sold, whereas the results of the line extension work are cited for only the first year of operation. Obviously, no utility could think of line extension work on the basis of such a first-year result which would be continued indefinitely. Granted a realization of hopes for increased revenues from the extensions over the future, the long-time maximum return therefrom would probably be limited by regulation to 7 per cent, or perhaps less, and over the first few years, corresponding to the average life of the appliances sold, the company would do well to recoup its early losses with little or no return on its investment. So we do have a reasonable basis of comparison in the two periods.

Compare, therefore, the deficit or lack of return shown on the line extensions with the outright profit of $75,000 indicated from the sale of electric appliances, which profit was after recouping an initial sales loss of $100,000. Certainly, the accounting statements alone which reflected the out-of-pocket cost of selling cannot be accepted as making up the complete picture of these activities.

It is only through this departure from sole reliance upon book figures and the merging of accounting and statistical analysis which yields nothing to accuracy, that true results of merchandising operations can be determined.

Our last point has to do with the lack of uniformity which plagues the utilities in rate proceedings in preparing statements of so-called "fair return income."

This matter is of outstanding importance to the utilites and relates to the diversity of views held by regulatory commissions and the courts with respect to the accounting disposition in rate proceedings of revenues and expenses relating to merchandising.

These differences of opinion can be accounted for only on the assumption that the true accounting and statistical result of merchandising could not have been placed before the tribunals which made these conflicting decisions. It would be borne in mind also that, in referring to the exclusion of revenues relating to merchandising, the decisions in all cases, so far as can be determined, referred to direct revenues from the sale of appliances and not to the revenues produced through the sale of additional current.

The utilities would be lax in such proceedings if, in those cases where regulatory bodies insist upon the exclusion of merchandising revenues and expenses from operating income and the exclusion of investments relating to merchandising from the rate base, they do not insist also upon the exclusion from operating revenues of the accretions to operating income of additional revenues from the sale of current consumed by the appliances sold. This would paint the picture with such a materially different color that the utilities, in all cases of wise merchandising, would gain by such exclusions, and would probably result in the treatment of merchandising activities as a part of the public service function which the utilities are chartered to perform.

The still unsettled status of the proper disposition in rate proceedings of the results of merchandising is to be found in the straddlng of the question in the draft of a proposed uniform system of accounts to be prescribed for electric utilities by the Federal Power Commission, which the commission has stated is to be made effective January 1, 1937. In its form of income statement provision is made for the determination of "operating income," which is the important computation of earnings to be applied to the rate base, first, by excluding therefrom the results of merchandising and, again, by including such results in operating income. In other words, "you pays your money and you takes your choice," but that choice is not one to be exercised by the utility but by the regulatory commission within whose territorial jurisdiction the utility may happily or unhappily be located.

**E. J. Fowler, Commonwealth Edison; F. W. Geist and M. F. Pierce of Western United Gas & Electric**

# Decries Government Competition

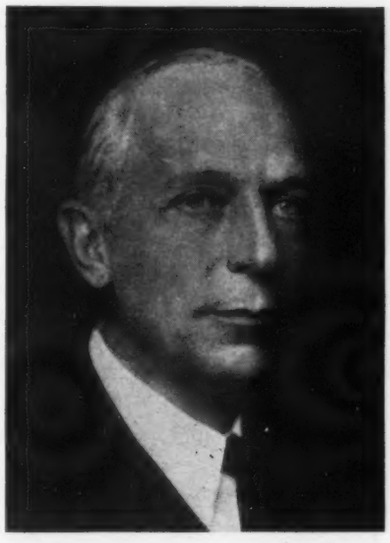
## Regulation Perverted Into Dictation Is Detrimental to Public—Tampering With Utilities Holds a Threat to All Business

By HARPER SIBLEY*
President Chamber of Commerce of the United States

PUBLIC utilities were the first to face the problem of governmental and business relationships, which now faces virtually all industries. The tendency to enlarge the scope of governmental control, and to limit proportionately the scope of individual initiative has been accelerated by the distress that always accompanies economic depression. Government—the federal government—has not stopped with taking over regulatory functions properly belonging to the states. It has in some instances attempted to go far beyond this point by displacing private initiative and management and substituting for it political initiative and management. This is repugnant to traditional American practice and principle. I am confident that time will prove that it is detrimental to the public whose interests it is intended to promote.

Today the electric power industry is the "guinea pig" for the hazardous experiment of resorting to public ownership to test the efficiency of private ownership. Other types of industries cannot ignore the implications of this experiment. If the entrance of government into the field of producing and distributing electric power could be justified in principle, it would require no stretch of conscience to project it into other fields of business. For this reason, what happens to you is of momentous concern for all business.

In the case of the public utilities, this experiment cannot be justly labeled a competitive test of efficiency. Extended, it becomes a war of extinction, as deadly in its effects as that which would be waged if one army were equipped with artillery and machine guns and the other with bows and arrows. To spend billions of dollars of public money, to set up federal authorities all over the country to dictate power rates, to subsidize states, cities, counties and districts can hardly be said to be an impartial way of determining whether government management is more capable than private management.



Even if we were to concede that it is all very well for those who have the public treasury behind them to experiment at public expense with economic ideas regarding the relation between consumptive demand and price, I as yet am unable to see any practicable application of the results of such experiments. Utility management is not free to make use of the invested savings of the public in the same sense that government is free to use the taxes it collects from its citizens. If your business is like other business in which I have had experience, you must be progressive in research, as responsive as possible in extending your services, but at the same time conservative in your use of funds. You must render an accounting. You must, by trial and error, feel your way into new areas of development. You cannot play "follow the leader" by plunging blindly into venturesome changes, whether in the nature of price reductions or any other modification of policies, because you are answerable to your investors as well as to your consumers. The former is a kind of responsibility of which government knows nothing.

The great concern of the public is to have an economic order which will afford them the greatest possible measure of benefit. It is not enough for business to justify itself in the light of constitutional precepts. It must also justify itself in the service it renders. I believe that is the true spirit of American enterprise. Conversely, the projecting of government into business enterprise is not to be condemned solely on the ground that it is defiance of constitutional restraints, but likewise on the ground that it would defeat the very purposes at which it is aimed by curtaling, rather than increasing, the benefits which the public derives from a system of privately managed business enterprises.

American enterprise can well point to the amazing things it has done in the past, the swift pace of progress it has set for every other country in the world. In business, as in mathematics, each advance simplifies old processes and opens the door to new accomplishments. We have reason for confidence in the future power of American enterprise, under our American system, to make continuing great contributions to the economic life of this country. It will be necessary to show what can be done, and to demonstrate that here lies the most trustworthy course for the future. Political bell ringing, roseate prophecies and visionary experiment will not take the place of actual achievement and will not satisfy the resolute courage and discriminating understanding of the individual citizen which are the bedrock upon which our American system is based.

*Abstract of E.E.I. convention paper.

# Unit Air Conditioners

## Promotional Potentiality Coupled With Virtue of Meeting Small-Scale Requirements

By R. H. TILLMAN*

New-Business Manager
Consolidated Gas, Electric Light & Power Company of Baltimore

DURING the past two years the self-contained unit conditioner which uses air for condenser cooling has been brought to a marketable stage. These units have an obvious advantage in portability, since almost any room has a window which can be adapted to provide a source of outside air for condenser cooling purposes. Of course, it is necessary for the unit to be located directly in front of the window which may present a disadvantage in some instances. Special removable fittings with alterable ducts connecting the unit to the window intake fixture have been designed for double hung windows. A large fan, which usually operates from the compressor drive motor, draws outside air over the compressor and discharges it through the condenser coils and thence through the duct to the outside. The water which is removed from the room air in the process of dehumidification drops from the evaporator coil to a pan beneath the condenser coil where it is picked up and thrown against the hot condenser surfaces by a spinner wheel. Thus, the water removed from the room air in the process of dehumidification is evaporated on the condenser surfaces and carried out of doors by the discharge air from the condenser.

This method eliminates the necessity for a gravity drain to handle the condensate and also improves, by evaporative cooling, the efficiency of the air cooled condenser. Units of this type to supply the average small office are available having power consumption that averages as low as 1,100 watts. However, the compressor motor in most cases must be ¾ h.p., or larger, so that it cannot be generally applied to 110-volt lighting circuits without disturbance to lighting. It is preferable to run a separate 220-volt, single-phase supply, which is a factor that affects to some extent the merchandising possibilities of these units.

Self-contained air-conditioning units of sufficient capacity to care for the average small office or room in a residence, with either water-cooled or air-cooled condensers, are available today at prices ranging from approximately $400 F.O.B. factory, upward. Under favorable conditions, the cost of electric, water and drain connections for the water-cooled condenser type would probably be within $40, and the cost of running special circuits to supply current to the air cooled condenser type would not exceed $25. One of the most desirable features of this equipment is the fact that it is virtually 100 per cent salvageable, so that it is readily salable to persons occupying offices, apartments or homes on a short-term lease basis.

*Abstract of E.E.I. convention paper.

### *Adapted to display*

These units are adapted for display on the sales floors of department stores and in utility company showrooms. Such displays, coupled with some general newspaper advertising and direct mailings to executive and professional classes should be productive of sufficient inquiries to form a basic prospect list. Any utility company should be willing to provide display space and should lend the weight of its name to any advertising campaign or, if necessary, inaugurate a campaign for the benefit of the merchandising agencies handling self-contained units. The equipment is well adapted for sales or promotion by companies that operate merchandise departments.

Sales solicitation can be made by specialty salesman who, through the exercise of reasonable judgment, should be qualified to inform a prospect as to the total cost of installation with sufficient accuracy definitely to establish or to eliminate the sales possibility. While every application should be checked for heat load by an experienced engineer, this can be done quickly and easily and no extensive engineering data or estimates are necessary for the completion of the installation. Of course, it is essential that the equipment be properly sold and applied. Self-contained units are not adaptable to any but the smallest installations and careful control should be exercised over the sales agencies handling them to prevent their use in places where full satisfaction will not be obtained from the operation.

Because of their semi-portable nature, self-contained air-conditioning units are not ordinarily equipped with heating coils, although heating coils are available in some makes which, when connected to a source of steam supply, will permit operation in winter as a heating and ventilating unit. One manufacturer is marketing a unit which embodies the reverse refrigeration heating cycle, which will provide an economical means of heating by electricity with outside temperatures as low as 40 deg. Such units may find wide application in the more southerly sections of the country.

### *Diversity of conditioning load*

Use of the self-contained unit presents the cheapest method of taking care of a single room or possibly two rooms. When more than two rooms are to be supplied, however, it is probable that a more economical installa-

tion can be effected by using unit air handling apparatus in connection with an external source of refrigeration. Such an installation has the advantage of permitting a real diversification of the refrigeration load between the individual rooms which will permit the use of a compressor of a capacity smaller than the total combined unit capacity.

This scheme is particularly desirable from the standpoint of the public utility since the operations will involve a lower peak demand with more full load hours. This condition will apply especially in residential installations where there is a high diversity in the use of rooms. For example a residential installation might require two tons of refrigeration capacity and three units to take care of the first floor living quarters during the day. The second floor sleeping quarters could be supplied during the night by the same two-ton compressor operating on three units located in the bedrooms. The installation could be equipped with switchover mechanism to control such operation, and the full use of the compressor thus extended over the period when both the living quarters and the sleeping quarters are occupied.

### *Air handling more complex*

Installation of air-handling units provided with refrigeration from an external source is, however, an engineering undertaking. The individual units must be carefully sized to the load in each room and the refrigeration system must be accurately sized to the diversified load of the units. Refrigeration liquid and suction lines must be run from the central compressor location to each unit by skilled refrigeration mechanics. Each unit must be equipped with a drain for the disposal of condensate from the evaporator coils, and it is usually necessary to insulate the refrigeration suction lines.

Air-handling units in such systems do not have to be as compactly designed as self-contained units and accordingly it is practical to equip them with heating coils and humidifying sprays for winter use so that they will provide all the functions of air conditioning the year around. While this equipment is not portable, it may be installed with relative ease and lack of disturbance in offices or homes equipped with conventional radiator heating, and will thus make complete air conditioning available to the large market of users occupying existing structures.

### *Readily installed*

With the self-contained unit, however, detail of installation has been reduced to a minimum. The equipment is simple and can be installed quickly at the request of the overheated customer who wants relief. This is particularly important because it is easier to sell a man air-conditioning equipment in hot weather when he feels a pressing need for relief. A prospect is more willing to make the decision to spend money for comfort if he knows that he can have the unit delivered, installed, and operating in from 12 to 36 hours. Self-contained units are available for immediate sale to prospects who would hesitate to buy if there were much delay between the signing of an order and the installation of the equipment.

It is natural for friends, business acquaintances and employees who find a practical application of air conditioning in a man's office or home to feel that it is feasible for them to have it, too.

The possibilities of the unit air conditioner as a revenue producer still remain to be determined. Based on estimates of average weather conditions and actual tests of the operation of air conditioning systems in Baltimore a unit air conditioner in the average commercial office should operate a minimum of 600 hours per season. Of course, the use in any particular case will depend upon the climatic conditions and the character of occupancy. As people become more accustomed to the benefits of air conditioning, and less conscious of operating costs, we may have to revise this estimate upward.

The power consumption of self-contained air-conditioning units varies from a minimum of approximately 900 watts to a maximum for the largest unit now offered on the market of 2,000 watts. The average of all installations will probably consume approximately 1,100 watts, so that power sales of 600 to 700 kw.-hr. per season per unit installed may be expected. The self-contained air-conditioning unit in a residence will probably not be used as many hours during the season as it will be in the average commercial office, for it is very difficult to confine the activities of a family to a single room. Single units in residences will probably be operated from 350 to 400 hours per season, though in a case of a unit used by an invalid or hay fever sufferer the use may run as high as 1,200 hours per season.

Residential installations involving the use of unit air-handling equipment provided with refrigeration from an external source taking into account the full effect of diversity of loads in various rooms may be run from 1,200 to 1,500 hours per season. A system such as previously described with six rooms in a residence, taken care of in alternates of three rooms, would require approximately 2 kw. for compressor operation and should result in the sale of from 2,400 to 3,000 kw.-hr. per season.

Normal commercial applications using unit type air-handling equipment with externally located refrigeration should operate approximately 700 hours per season, the kilowatt sales, of course, depending upon the size of the installation.

### *Isolation in sales not advocated*

Summing up the various factors that pertain to unit air conditioners, we feel that such equipment is not strictly comparable with other electric appliances such as refrigerators, washing machines, ranges and water heaters. There are elements in connection with its application and installation which place it in a category distinct from that occupied by the usual package-merchandise article. It is really one phase of the whole air conditioning-engineering activity and the attempt to divorce it from this and place it on a separate plane, while it may to a certain extent be possible, does not appear to be the most practical and efficient method.

For certain purposes, unit air conditioners offer the ideal means of filling an air conditioning need. In doctors' and dentists' offices and other single offices, these units are practical and there should be large sales possibilities, because prospects of these general classes can usually afford the installation. There should be a substantial field for their application in homes, although the possibilities here are more uncertain.

Home owners who are willing and able to make the investment required to air condition one or two rooms, will usually want a more complete application of air conditioning. For sickrooms, however, and in homes where there are invalids or hay fever sufferers, the self-contained unit is a modern innovation that fulfills an essential need and is within reach of persons of quite moderate means.

The significance of the unit air conditioner lies in its promotional possibilities and the fact that it gives us a suitable medium to supply small-scale requirements. If we can make full use of it in its proper place, with out "overselling" it and without expecting it to be a panacea for all air-conditioning needs, it will prove exceedingly valuable in bringing to the public mind the realization that air conditioning is available for general use now.

# Noteworthy Developments in Farm Lines

## Simplified Construction Bids Fair to Meet Economic and Performance Requirements for Rural Radials

By A. E. SILVER*
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ENGINEERING planning finds opportunity for considerable skill in fitting to an over-all area an adequate and the most economical system of lines. This calls for the highest effective portion of this mileage in single-phase farm laterals of definitely limited length and capacity. The main or backbone feeders, by function, must be of substantial capacity and usually three-phase. Design planning also co-ordinates features of supply and of circuit control, usually with net savings, because measures can be adopted that could not be afforded under a piecemeal extension procedure.

The backbone rural feeders and supply facilities need to be adapted to the specific conditions of each situation. While these constitute a very real part of the investments, it is evident that, for some time at least, the major opportunity for economies rests in the simplification of the single-phase farm lines or laterals. Quite largely, these farm laterals can be tapped from existing rural or industrial feeders.

### *Quality of service*

Service entirely adequate and satisfactory for the normal needs of the farm must be provided. This does not mean that standards of service practiced in urban areas should be transplanted to the farm without reflection upon unnecessary refinements. The farmer does not wish to pay for that which he does not need. There are two essentials:

(a) Reasonably steady voltage held within a range to give good performance of heating appliances. With the general level properly set a maximum over-all range of from 10 to 15 per cent will give good results with modern appliances.

(b) Avoidance of interruptions of other than brief duration.

*Abstract of E.E.I. convention paper.

While prolonged interruptions are serious to many farm uses, for example, such as milking and incubators, momentary interruptions are harmful to very few, if, any farm processes.

The farms can be well served by effectively controlled radial circuits, without duplication of facilities. These farm circuits, out in the open country, will be much more exposed to lightning than the shorter and naturally shielded urban circuits. Frequent spillovers of insulators by lightning must be accepted as unavoidable. This then requires that these lightning spillovers, or faults from any cause, must be prevented from burning insulators and conductors. Except for blown transformer cutouts, burned-off conductors have been the major cause of prolonged interruptions. This avoidance of thermal damage and harmful interruptions can be largely accomplished by simple applications of modern rapid fault disconnection and circuit reclosure. Experience over the past few years has shown from 80 to 90 per cent of rapid automatic circuit reclosures to be successful.

Farm lines and customer installation must be designed and built for reliability and good life. Servicing and maintenance attention must be kept low. This does not mean that materials should be selected from urban practice, which, for example, has been standardized on 7 to 8-in. top poles with fittings adapted to these dimensions. Strength requirements should determine pole size, and fittings should be suited to the reduced demands. Pole size does not determine pole life. The important element in wood pole life is preservative treatment. With effectively treated poles, the earlier idea of adding material against future decay is no longer valid.

### *Reliability of construction*

Safety must be a foremost objective. Simplification of design, aiding ample primary working clearances, provides safety. Grounding is a generally accepted requirement for public, customer and workman safety. In the country where grounding installations do not have the benefit of extended water pipe networks, the common primary and secondary neutral, run continuous from customer to customer, has a definite advantage. All grounding installations are thereby placed in multiple, providing a definite safety feature.

The aim—all available reduction of investment costs—calls for all practical simplification, both in major features and in details. In the present stage of the farm line development it is important to seek savings, even though of only a few cents, in every possible item. These minor savings when added up constitute a large item in the whole.

The simplest type of farm line is the

single-phase circuit with the two wires supported on the pole without cross-arms, one wire being uninsulated and multi-grounded as a common primary and secondary neutral. This single-phase lateral can be tapped directly from a three-phase, four-wire grounded neutral backbone rural feeder.

Where the main feeder is three-wire, either delta or star-connected, this same type of lateral can be tapped off by utilizing a special one to one, or similar ratio transformer, as a means of establishing the ground on the farm-line circuit. This may not be economic for short lines, however.

The new single-bushing, farm-type transformer is adapted to this type of circuit. With the transformer installations approaching one per farm customer, individual transformer accessories become disproportionately expensive. This offers another opportunity for simplification by omitting at individual installations and centralizing at strategic points certain functions, such as of transformer taps and primary cutouts.

While farm lines must be built on or near the highways, location and alignment, particularly with relation to tree conditions, are substantial elements in simplifying construction and determining operating and maintenance costs. The rapidly increasing guidance in pole location, by highway officials, varying among the states, must be recognized and may be a factor in determining costs. In some situations, location on private property just off the highway, either continuously or for intermittent stretches, may be decidedly advantageous. The procedure in securing right-of-way must be planned to gain and utilize the full co-operation of the farmers at interest.

### *Co-ordination with communication circuits*

Frequently, if not usually, these farm lines must be built in close proximity to communication circuits; most of these being telephone circuits serving the same farmers that are to become electric power customers, and many being of the ground-return type. Probably most of these were built some years ago on the easiest locations and, unfortunately, with little attention given to being neighbors with power circuits that might be built later.

Problems of both physical and inductive co-ordination are encountered in these situations and must be worked out by the parties at interest. Modernizing the telephone circuits by metallicizing and confining to one side of the highway will generally be required. Co-operative steps should be initiated at the beginning and carried on as the needs require. Co-ordination of these types of facilities is a technical problem, requires specialized engineering study and has never been satisfactorily worked out in any other way.

The higher voltages for rural distribution circuits materially reduce the problem of voltage regulation, also frequently provide further savings by avoiding stepdown substations. In a situation, however, where the voltage level is unsatisfactory, centralized control rather than providing taps in all individual transformers is conducive to simplicity. A simple booster transformer installed at a circuit junction will provide the needed voltage level adjustment. Where the voltage drift is considerable, such booster transformers may be equipped for simple, one or two step, automatic throw-over, should this be found advisable. It is a task and expensive to change taps in individual transformers, but this becomes easy with the booster.

### *High-strength conductors and long spans*

With the strictly farm lateral design, effort can be concentrated on the mechanical features of the line. The most obvious simplification can be gained through the combination of high-strength conductors and long spans. Conductors may be of any reliable high-strength material with only very moderate conductivity. With the lower primary voltages conductivity requires somewhat greater consideration. While hard-drawn copper has prevailed, other conductors of greater strength may be used to advantage, including galvanized steel and either copper or aluminum reinforced by steel. Splices, ties and taps are available for these conductors. However, the present concentration on these details doubtless will bring improvements.

This long-span construction is an adaptation from the extensive experience with high-voltage transmission lines. The objective is to utilize as much of the conductor strength as practicable. The control of high-frequency mechanical conductor vibration effects is an inherent problem and must be taken definitely to account in design. Past experience and study give a good insight to the technique of avoiding vibration fatigue. Localized conductor stresses at supports, taps and splices must be kept on the safe side of the fatigue limit.

The stage has been reached where it is costing as much, or more, to provide the transformers and complete the customer's installations as for the line itself. This was the incentive for a simplified transformer installation. Several things could be done in the transformer design, including: omitting taps, eliminating one primary bushing, connecting the neutral end of both primary and secondary windings to the transformer tank interior, incorporating an open spill gap from the primary terminal to tank for protecting transformer insulation from lightning, eliminating conventional hanger irons by mounting directly on the pole with interchangeable mounting dimensions for all sizes, omitting terminal provisions for series-multiple connection of secondary coils.

### *Line and equipment protection*

It is fundamental that circuit faults from lighting and other causes must be accepted, but that thermal damage and prolonged interruptions therefrom must be avoided. This can be done by the application of modern, reasonably simple, automatic circuit opening and reclosing devices. These may be either automatic reclosing circuit breakers or automatic reclosing fuses. For restricting the area subjected to an unavoidable permanent fault, a simple fuse may be installed to cut off any selected section of a circuit. This would be set for delayed opening, but to function before the automatic reclosing control reaches the lock-out stage. These reclosing circuit control devices may be installed only at the supply station, or also at junction points in the line, depending upon the geographical extent of the circuit.

A spill gap at each installation for the protection of transformer insulation may somewhat increase the number of times that these reclosing devices will be called upon to function; however, with effective fuse and relay co-ordination this increase will have no practical effect on service. Insulation levels need not be higher than adequately to provide against surges of internal system origin.

With this type of control and a protective gap at each transformer, transformer primary cutouts can be omitted. To protect service from a permanent fault in the event of a damaged trans-

former a weak link can be installed in the primary lead, preferably inside the transformer tank, calibrated to open on nothing less than a burned-out winding. However, when effective secondary protection is used the need for this device may be negligible.

It is impracticable to prevent transformer damage from overload by primary fusing, esepecially in the smaller sizes. Overload protection is desirable although probably not urgent. For suitable calibration it should be in the secondary side. The simple form of such protection is a fuse in the secondary lead, and devices of this kind are available. Nevertheless, a thermally actuated automatic circuit breaker, incorporated in the transformer will be the ideal device, if and when available at low cost.

Simplification in services and meters may be accomplished by the effective use of recent developments and materials, including such items as the outdoor meter and non-metallic service entrance cable. Open-wire construction will be the most economical where suited to the conditions.

The field conditions for building farm lines are decidedly unlike those in urban areas. The problems of transportation, working equipment, working methods, crews are all different. Farm line construction needs to be organized on the peculiar merits of the local situation. Simplification is effective here.

### Recent Examples of Low-Cost Single-Phase Farm Lines

| | Arkansas Power & Light Co. Benton Rural Line | Louisiana Power & Light Co. Choudrant-Downsville Line | Memphis Power & Light Co. Mt. Moriah Road Line |
|---|---|---|---|
| Mechanical loading (N.E.S.C. basis) | Medium | Light | Medium |
| Length of line | 8 miles | 16 miles | 1 mile |
| Customers per mile | 5.5 | 2.1 | 4 |
| Terrain | Hilly. Road crooked | Hilly. Firm clay ground | Road partly crooked, firm clay |
| Location | On highway | On highway | Part on highway, part private right-of-way |
| Primary voltage (phase to neutral) | 7,620 v. | 7,620 v. | 6,900 v. |
| Configuration | Vertical spacing with pinnacle pin primary | Vertical spacing with pinnacle pin primary | Vertical spacing with pinnacle pin primary |
| Average span length (with secondaries present) | 340 ft. | 350 ft. | ..... |
| Average span length (primaries alone) | 340 ft. | 448 ft. | 500 ft. |
| Length of secondaries in percentage of primaries | 33% | 31% | None |
| Poles (prevailing) | 30-ft., 5-in. top creosoted pine | 30 and 35-ft. Class 7 creosoted pine | 30-ft., Class 8 creosoted pine |
| Primary conductors | No. 6 bare H.D. copper | No. 4 A.C.S.R. | No .8 solid copperweld |
| Secondary conductors | No. 6 bare H.D. copper | No. 4 A.C.S.R. and No. 6 copper | None |
| Service conductors | No. 8 W.P. copper | Concentric cable 2 No. 6 or 2 No. 6 plus 1 No. 8 | Concentric cable 2 No. 8 |
| Number of distribution transformers | 8 | 16 | 3 |
| **Costs** | | | |
| Primaries and structures (per mile) | ..... | $365.00 | $393.00 |
| Secondaries (per customer) | ..... | 28.00 | None |
| Transformers, services and meters (per customer) | ..... | 68.00 | 91.00 |
| Total per mile of line | $660.00 | $632.00* | $759.00 |
| Total per customer | $120.00 | $300.00* | $190.00 |

*These totals include a small step-down transformer substation, 13,200 v. to 7,620 v,, with reclosing fuse, amounting to $44 per mile.

### *Results*

During 1935 rural lines in the aggregate of 3,300 miles were built by the operating companies of Electric Bond & Share Company group. The programs for 1936 aggregate about 5,000 miles, although not all of these lines can be of the fully simplified type.

The figures in the tabulations also give the essential items of construction costs for specific examples of farm lines, broken down in dollars per mile and in dollars per customer. These figures do not contain allocations of general system investments, nor for backbone feeders, substation or junction controls, special supply transformers, and the like, except that the totals for the Louisiana Power & Light Company contain $44 per mile for the latter item.

### *Service and mechanical performance*

The period during which these lines have been in operation is not sufficient for any final judgment; nevertheless the results to date have been satisfactory and gratifying. All companies reporting state that satisfactory service has been maintained, service calls have been moderate, prolonged interruptions have been infrequent. Definite figures as to the number of momentary interruptions are not available, but these have not been objectionable. Satisfactory voltage regulation has been reported. Booster transformers have seldom been needed and even more rarely where the higher distribution voltages have been used.

As would be expected, no appreciable maintenance experience has yet accumulated. However, the lines constructed by client companies last year were subjected, in practically every locality to severe weather conditions. No difficulty whatever has been reported from failure of poles and supporting devices, other than an occasional yielding guy anchor. Certainly, thus far, there is no support for the skeptics who believe that these rather radically designed lines are soon going to fall down and encounter disastrous maintenance expense.

### *Transformer dependability*

First experience with the new type farm transformer has been satisfactory, from all reports received to date. Out of some 1,500 units installed very few failures have occurred. Other than for a few factory errors these failures have been due to exterior secondary faults. Most of these would have been avoided by the use of secondary protection. The tendency to apply this protection is increasing.

A feature of transformer design which has been viewed with both interest and apprehension is the open spill gap for insulation protection from lightning. Reports to date have not included a single instance of failure of the gap to protect the insulation. It is true, however, that as a whole these transformers were in service only during a lesser portion of the 1935 lightning season.

The breakdown disconnecting link in the transformer primary lead deserves some improvement, as in a few isolated cases this has opened without due cause, or has failed to clear the circuit when functioning on transformer burn-out.

Although experience from operation to date is brief, on the whole it is gratifying and lends confidence that this simplified farm line development is capable of measuring up to the objective engineering premises. It is to be expected that further experience will bring out details which will need to be modified. It is also reasonable to expect that experience and continued study will bring improvements and further economies not at present foreseen.

# Farmer Increasingly Set on Electricity

## Financial Limitations Call for Long-Range Support Program, Not Minimum Debt Commitment

By E. A. WHITE*

Director Committee on the Relation of Electricity to Agriculture, Chicago

IT IS significant that the national demand for rural electric service began to be expressed about the same year—1920—as has been designated for marking the beginning of a new era in agriculture. This was truly a desire of the farmer. It came from the grass roots upward. It has grown in both volume and intensity through the intervening sixteen years of transition, during at least one-third of which agriculture has been sorely afflicted with an economic depression. It is especally significant that during no single year of this period has there been a decrease in the total number of farmers served.

Today, electric service is available to one million farms and perhaps three million non-farming rural residences, business institutions, etc. In the immediate future the extension of rural lines will be more and more a purely farm problem as the majority of non-farming rural prospects have already been reached.

According to the best information available, about one-seventh of the total number of farms are classified as fruit, truck, poultry, or dairy; more than one-thrd are classified as cash crop farms, such as grain and cotton, without any appreciable amount of livestock; slightly less than one-sixth are listed as general, and less than one-tenth are livestock other than dairy. So, on at least one-half of the farms of the United States the chief use would be in the household, and on a large percentage of this classification, the only use for electricity.

Thus to a large extent, even on dairy, poultry, and fruit farms, the use of electricity relates directly to living standards. That the farmer should have a high living standard is granted without one word of argument. It is clearly in the direction which we must look for sustained natonal prosperity. But an improved standard of living brings with it the necessity of meeting the costs of the same. Here we come face to face with the biggest hurdle in the path of rural electric development. The farmer wants the service. It will fill a real need. The sad fact is that the present farm income does not measure up to this opportunity. Gross farm income for the current year is estimated at $8,000,000,000, or an average of about $1,200 per farm—$100 per month. However, this does not tell the whole story.

It has recently been reported that 80 per cent of the gross farm income is enjoyed by 35 per cent of the farmers. So we find 2,400,000 farmers with a gross income of $6,400,000,000 and 4,400,000 farmers getting along with a gross income of $1,600,000,000 or less than $400 per farm year. It is thus obvious that a material improvement in farm income is necessary for rural electrification to flourish in many regions.

What is reasonable to expect from agriculture in the near future? I believe developments will be along the following lines:

1. There will be a gradual increase in farm income.
2. The process of abandoning or combining into larger units the marginal farms, will continue.
3. The regaining of our export markets will be a slow process. At the moment it is problematical how much of this business we will ultimately secure.
4. The solvent farmer will continue to be cautious about going into debt for other than productive purposes.
5. The cityward movement will not be phenomenal. Instead, much more attention than has been the case in the past, will be paid to modernizing the farm home. Surplus resources, when available, will be employed to build up the farm.
6. Profit will come from operations rather than increment in the price of land.
7. Continued efforts will be made to enlarge the market for agricultural products in other outlets than food for human consumption.
8. The mechanization of farm operations, especially on farms of the higher income brackets, will continue at a rapid rate. Here electricity will play an ever-enlarging part.

Financial limitations on the parts of these prospective customers will undoubtedly call for a long-range, well-developed program which many people would term conservative, but which really will be distinctly progressive.

The avenue often suggested for the farmer without available cash is to borrow. While there is no generalization which fits all cases, I doubt the wisdom of a general movement designed to plunge agriculture further into debt at this time. Furthermore, there is little danger of such a movement going far for the simple reason that these prospective farm customers, by and large, are not going to rush into debt, not even for the pleasure of putting electricity to work.

Today we need more of the determination on the part of both business and government to serve the farmer intelligently rather than so much of this desire to patronize, reform or educate him. His record indicates an ability to cope adequately with those things which are distinctly his own business. Furthermore, if I know him at all, he feels, and is, perfectly able to do so. He has no idea of willingly surrendering his freedom of thought and action.

*Abstract of E.E.I. convention paper.

# Use of Firm Capacity Ratings

## Aid to Design and Operation — Method of Analysis and How to Apply — A Means to Hold Down Investment for Added Capacity Until Needed

**By M. S. DEAN***
Chief Assistant Electrical Superintendent Detroit Edison Company

IT HAS been said that the operation of an electrical system consists in large part of the intelligent taking of chances and that certainly applies to the loading of it, particularly when it is considered that the maximum safe loading in any particular situation turns so largely on what emergency ratings one may count upon with a part of the equipment out of commission for repairs. Unfortunately there is often little agreement as to emergency ratings and not infrequently a dearth of knowledge. However, the problem is here and must be faced and where accurate knowledge is not available, intelligent approximation must be relied upon.

The intelligent taking of chances is also highly important in the field of system design. A system built to be foolproof and to guard against every conceivable contingency is not only unreasonable from the point of view of cost, but is likely, if expanded indefinitely, to become unwieldy from sheer mass of detail and from operating complication. The clever system designer will fortify himself with a background of actual operating performance to insure that in setting his emergency conditions he will be spending money to guard against actualities and not against situations which rarely, if ever, occur.

In considering the loading which may reasonably be imposed in any situation, the number of factors to be considered is rather large and it is difficult to keep these in mind and to give to each its due importance.

### *Firm rating method*

To aid in evaluating these factors, the method of firm rating has been devised. In any particular situation the *firm rating may be defined as the amount to which the load may be increased before additional load carrying capacity must be provided.* Its determination implies a thorough knowledge of load and system conditions and an understanding of the overload ratings of the various equipments which comprise the system.

In the field of generating capacity the firm rating idea works about as follows: Let us assume first a system having a single generating plant and few enough generating units so that their maintenance can be safely carried out in the off-peak season, thereby assuring that all units will be available during the peak season. If now we assume the largest unit to be out of commission due to an emergency, *the firm rating of a steam plant will be the maximum overload rating of the remaining machines* as determined by boiler conditions, cooling water temperatures, and generator limitations; and that of a hydraulic plant will be determined by stream flow and storage conditions. It is usually necessary to test the various generating units from time to time to determine their actual overload ratings under the particular conditions. One is justified in assuming for emergency purposes the maximum overload ratings because load estimates made a year in advance are usually liberal and peak loads are encountered on only a few days per year and usually persist only a few hours.

Where a generating system consists of several plants interconnected by inter-plant tie lines and the number of generating units becomes large, it be-

*Abstract of E.E.I. convention paper.

**Table I—Firm Rating of Typical Generating Plant and System, Winter or Spring Condition**

(Ratings in Megawatts)

| Generating Plant | Boilers: Total Number | Boilers: Number *Firm | Boilers: Firm Rating | Generator Ratings: Name Plate | Generator Ratings: Maximum | Generator Ratings: Maximum Less Two | †Total Tie Line Rating | Plant Maximum Rating | Plant Firm Rating | System‡ Firm Rating |
|---|---|---|---|---|---|---|---|---|---|---|
| A | 5 | 4 | *153* | 160 | 172 | 64 | 60 | 153 | 124 | 744 |
| B | 13 | 11 | *300* | 300 | 325 | 215 | 75 | 300 | 290 | 748 |
| C | 12 | 10 | 200 | 180 | *190* | 100 | 70 | 190 | 170 | 743 |
| D | 8 | 7 | *165* | 160 | 169 | 85 | 70 | 165 | 155 | 753 |
| Interconnections | .. | .. | ... | 25 | 25 | .. | .. | 25 | 25 | ... |
| Totals | | | | 825 | | | | 833 | | |

‡ System nameplate rating, 825 MW. Minimum system firm rating, 743 MW. Minimum system reserve, 82 MW. (10%).

*Assumes normal boiler maintenance. †One day maximum tie line ratings. ‡Assumes two machines out at the plant in question, and all other plants at plant maximum.

## Table II — Ratings of 24-Kv. Three-Conductor Cables

**Summer Schedule (May 15 to Nov. 15)**

| | Cond. Size | Normal Loading Amp. | Normal Loading Kva. | Emergency Loading: One Day Amp. | One Day Kva. | One Hour Amp. | One Hour Kva. | See Note* Amp. |
|---|---|---|---|---|---|---|---|---|
| Inter-plant tie cables and cables feeding industrial substations | 350M | 240 | 10,000 | 280 | 11,640 | 530 | 22,000 | 200 |
| (75 per cent daily load factor) | 210 | 140 | 5,800 | 160 | 6,650 | 275 | 11,400 | 115 |
| | | | | | | Peak During Lighting Period | | |
| Cables feeding residential substations | 350M | 260 | 10,800 | 300 | 12,470 | 445 | 18,400 | 220 |
| (60 per cent daily load factor) | 210 | 150 | 6,250 | 175 | 7,275 | 235 | 9,750 | 125 |

**Winter Schedule (Nov. 15 to May 15)**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | One Hour | | |
| Inter-plant tie cables and cables feeding Industrial substations | 350M | 270 | 11,200 | 305 | 12,680 | 540 | 22,400 | 235 |
| (75 per cent daily load factor) | 210 | 155 | 6,450 | 175 | 7,275 | 285 | 11,850 | 135 |
| | | | | | | Peak During Lighting Period | | |
| Cables feeding residential substations | 350M | 290 | 12,050 | 320 | 13,300 | 455 | 18,900 | 255 |
| (60 per cent daily load factor) | 210 | 165 | 6,850 | 185 | 7,690 | 245 | 10,150 | 145 |

**Notes**

*Allowable load previous to application of one hour or lighting period rating, causing copper temperature of 50 deg. C.

Above data cover six cables in 3x4 duct, each normally loaded, or for one-day ratings one cable carrying emergency load with remaining cables normally loaded. For the one-hour ratings up to four cables may be so loaded in a single duct bank.

Normal loading to give copper temperature of 66 deg. C; emergency loading, one day 85 deg. C., one hour 90 deg. C.

comes difficult to complete all maintenance work during the off-peak season. It may, therefore, be advisable to assume that one or possibly two units are out of service for maintenance work at the time of system peak and that another fails at that time and further, that two units may be out of service in the same plant. *The firm rating of each plant then becomes the sum of overload ratings of its remaining units plus the help which the inter-plant tie lines can bring in from the remainder of the system, including interconnections.* The rating of the remainder of the system can, under such conditions, be considered as equal to the sum of the overload ratings of all its units unless there are some inter-plant tie line limitations.

Considering the generating plants from the design point of view, it is evident from the above that since the assumed emergency condition is based on a given *number* of the largest generators being out of commission, the size of the generating units chosen is an important consideration in determining the firm rating of system or plant. If they are large in proportion to the system, then the firm rating will be a smaller percentage of the nameplate rating than if the generators were smaller. On the other hand, the cost per nameplate kilowatt of generating capacity increases as the size of the generators decreases. There are therefore two conflicting tendencies which are not easy to evaluate. If it is remembered that the purpose is to carry the load at the minimum cost, it becomes evident that the criterion is the cost per kilowatt of firm rating. *In general, therefore, that generating system is best developed in which the generating unit sizes are so chosen as to give, over a period of years, the lowest cost per kilowatt of firm rating.*

In the field of transmission and substations the method of firm ratings is also readily applicable and useful.

Let us first take the case of the transmission stepdown station; that is, where the load center is sufficiently remote from the generating source to require high-voltage transmission. The usual procedure is to assume the loss of the largest unit, be it line or transformer back, and to base the firm rating on the maximum overload of the remaining units.

If that largest unit is a high-voltage transmission circuit, the limitation imposed may be that of low voltage, and if so *it is necessary to agree on a minimum allowable voltage for emergency conditions.* Usually that voltage will have to be determined by the actual distribution circuit and regulator conditions in the load area served or it may be limited by a high voltage service to some large customer. No general rules can be laid down. Each case must be decided on its merits. Occasionally voltage conditions in some single distribution substation will sharply limit the minimum allowable voltage at the transmission substation. In such cases a moderate expenditure at the distribution substation may result in a desirable increase of firm rating at the transmission substation.

## Table III — Typical Emergency Overload Cycles for a Distribution Substation Stepdown Transformer

6,000-Kva. Transformer, Three-phase, Self-cooled

Emergency Load—Once a year without material injury

**30 Deg. C. Ambient**

| Industrial Load | Residential Load |
|---|---|
| 3,850 kva.—16 hours | 2,750 kva.— 9 hours |
| 7,700 kva.— 8 hours | 4,950 kva.—11 hours |
| | 8,250 kva.— 4 hours |

**40 Deg. C. Ambient**

| Industrial Load | Residential Load |
|---|---|
| 3,500 kva.—16 hours | 2,500 kva.— 9 hours |
| 7,000 kva.— 8 hours | 4,500 kva.—11 hours |
| | 7,500 kva.— 4 hours |

Residential Load—Overload without exceeding guaranteed temperature

**10 Deg. C. Ambient**

6,000 kva.—20 hours
9,000 kva.— 4 hours

### *Capitalized overload ratings*

If the largest unit be a transformer bank, the safe overload rating of the remaining transformers is the limiting case. Here a careful study of typical daily load cycles to determine the duration of peak loads and to take maximum advantage of the infrequency of peak load days as well as a study of the season during which the peak loads may occur and the probable ambient temperatures will often pay excellent dividends in firm ratings by insuring the maximum allowable emergency rating of the transformers. Overload ratings on straight self-cooled or water-cooled transformers will range from 10 to 25 per cent and on self-cooled transformers with emergency air-blast or water-cooling from 30 to 50 per cent.

If the limiting case is the loss of inter-station ties, the limit may again be voltage regulation, or if they be cable ties it may be the thermal limit of the cables. If the thermal limit applies, again a thorough study of maximum one day ratings pays excellent returns. Cables and duct banks can safely carry surprisingly large loads for a few hours on an occasional peak day, particularly in the cooler seasons. Table II illustrates the results of some

## Table IV — Ratings of 4,800-Volt, Three-Conductor Cables

**Summer Schedule (May 15 to Nov. 15)**

| Cond. Size | 40% D.L.F. Amp. | Kva. | 60% D.L.F. Amp. | Kva. | 100% D.L.F. Amp. | Kva. |
|---|---|---|---|---|---|---|
| | Normal Loading | | | | | |
| 450Mcm. | 360 | 2,990 | 330 | 2,740 | 285 | 2,370 |
| 200M.... | 240 | 2,000 | 220 | 1,830 | 190 | 1,620 |
| | Emergency Loading | | | | | |
| 450M.... | 420 | 3,490 | 385 | 3,200 | 335 | 2,780 |
| 200M.... | 265 | 2,200 | 245 | 2,040 | 220 | 1,830 |

**(Winter Schedule (Nov. 15 to May 15)**

| | | | | | | |
|---|---|---|---|---|---|---|
| | Normal Loading | | | | | |
| 450M.... | 390 | 3,240 | 360 | 2,990 | 310 | 2,580 |
| 200M.... | 255 | 2,121 | 235 | 1,950 | 210 | 1,745 |
| | Emergency Loading | | | | | |
| 450M.... | 450 | 3,740 | 410 | 3,410 | 360 | 2,990 |
| 200M.... | 285 | 2,370 | 265 | 2,200 | 235 | 1,950 |

Notes—All ratings based on six similar cables in a 3x4 fiber duct bank.

Normal Loading: Same load on all cables. Copper temperature 85 deg. C. Summer earth temperature 20 deg. C. Winter earth temperature 10 deg. C.

Emergency Loading: Five cables normally loaded, one cable carrying emergency load. Copper temperature 90 deg. C. Summer earth temperature 15 deg. C. Winter earth temperature 5 deg. C.

D.L.F. = Daily load factor.

24 kv. transmission cable rating studies which take account of ambient temperatures and load cycles.

Again, as in the case of generating plants, an understanding of *firm ratings should aid in the choice of substation designs and unit sizes to give the lowest overall cost per kilowatt of load-carrying capacity.*

In the field of subtransmission and distribution substations the general limits are the same as those outlined for transmission stepdown stations. In suburban territory where overhead subtransmission lines are employed, the firm ratings of the distribution substations are usually determined by the emergency ratings of the distribution substation stepdown transformers. In small substations a single delta-connected transformer bank is often used and open-delta operation is depended upon for emergency service. The emergency rating of the remaining transformers is rarely set at less than 125 per cent normal and may often be set higher if the load is predominantly lighting.

Where small suburban substations are fed by a single radial subtransmission line or are tapped to such a line through fuses, long outages are occasionally encountered with resultant concern as to the necessity for high-voltage switching or for a second feed to the substation. In one such situation a careful study of system trouble records showed that such storms either occurred in the late afternoon before sundown or between midnight and morning, that is, outside the lighting load period. Therefore, the additional expense of switching or new subtransmission could be rarely justified.

### *Repairs during overload period*

In the field of distribution lines themselves the situation is somewhat different. On overhead distribution systems the lines are usually arranged so that when one so fails that its service cannot be restored by reclosing the substation breaker, it can be sectionalized and the sections connected to neighboring circuits. The maximum probable load then becomes the circuit peak plus the peak of the largest section of a neighboring circuit likely to be connected to it. The duration of this overload is long enough to repair the cable running into the substation, that is, one daily load period. The emergency rating is therefore determined by the cable running out of the substation or possibly by the circuit voltage regulator, if that is left in circuit.

In the field of underground a.c. distribution, which usually means network, the problem is not unlike that of the distribution substation. The firm rating is determined by the one-day emergency cable ratings, or by the assumed overload rating of the network transformers, which is quite commonly set at 150 per cent normal rating. The overload period is usually one daily load period, since that gives time enough to repair a cable. Ambient temperature is of course an important consideration in determining these overload ratings.

The above examples will serve to illustrate the applications of firm ratings most commonly encountered. It may be said that there is nothing new in firm ratings, but that it is a convenient way of showing the resultant of the complicated and sometimes conflicting factors which enter into system loading and system design.

## Table V — Typical Emergency Overload Cycles for Self-Cooled, Three-Phase Induction-Voltage Regulators

125 Kva. Regulator

Maximum Safe Load Cycles for Residential Load at Various Ambient Temperatures—

| 10 Deg. C | 20 Deg. C. |
|---|---|
| 60 kva.— 9 hours | 56 kva.— 9 hours |
| 109 kva.—11 hours | 101 kva.—11 hours |
| 181 kva.— 4 hours | 169 kva.— 4 hours |

30 Deg. C.
51 kva. — 9 hours
94 kva.—11 hours
156 kva.— 4 hours

Maximum safe load for cyle of 113 load for 20 hours and full load for 4 hours

10 Deg. C. Ambient
62.5 kva.—20 hours
187.5 kva.— 4 hours

Maximum safe load on Industrial type load cycle
10 Deg. C. Ambient
85 kva.—16 hours
169 kva.— 8 hours

**H. P. Sedwick, G. G. Bailey and D. C. Wilkins, all of Public Service Company of Northern Illinois**

J. S. Tritle, Westinghouse, and C. L. Harold, Consolidated Edison

Floyd Carlisle, Louis H. Egan, Thomas N. McCarter, Bernard Weadock

Freeman H. Barnes, Nela Park; Preston S. Millar, Electrical Testing Laboratories, New York; E. D. Striker, Nela Park; C. L. Davis, Buffalo

C. E. Swartzbaugh, Swartzbaugh Mfg. Co., Toledo, Ohio

Arthur H. Kehoe, Consolidated Edison, New York; H. P. Sedwick, Public Service Company of Northern Illinois; Alexander Maxwell, E.E.I.

S. M. Dean and Harry Snow, Detroit Edison

# To Modernize Means Electrify Your Kitchen

## First a Kitchen Plan and Then the Successive Acquisition of the Matched Units—Operation Building Another Market

By
**GEORGE E. WHITWELL***

Vice-President in Charge of Sales
Philadelphia Electric Company

I OFFER you the Kitchen Modernizing Program as a method of replacing the old with the new; of putting to work the tremendous advances in technology of electric kitchen appliances; of increasing employment by creating more jobs through making existing electrical goods and services constantly better, and of pioneering still newer things to be built tomorrow. The Kitchen Modernizing Program will not only serve progress but will serve our customers, ourselves, and the whole of America.

Three years ago, at the first annual convention of this association, it was my opportunity to speak to you in connection with the then unamed Better Light—Better Sight Program. I did not know then that that program was really the subject of my talk, for the activity was only in its beginning or conversational stages. But those were profitable conversations because all of us are reasonably familiar with what the Better Light—Better Sight movement has done not only for our industry but also for a number of allied industries. Today the National Kitchen Modernizing Program, just emerging from the conversational stage, lies before you. It has much in common with the Better Light—Better Sight Program. It merits your attention.

There is nothing particularly new about electric kitchens. I remember well when, fifteen years or so ago, as a gas man on the Pacific Coast, my chief worry was to compete with the all-electric kitchen. The idea was well started then. The novelty of the present activity lies in concerted action by the industry as a whole toward accelerating the acceptance by the public of the modern electric kitchen. It provides a new national approach to the selling of electrical kitchen appliances.

The purpose of the program is to sell a planned kitchen to the housewife, thus giving the industry a new tool for more rapid, and perhaps volume, selling of ranges, water heaters, refrigerators, dish washers and other kindred devices. It may be operated in either or both of two ways: (1) The entire modernization may be carried out all at once or, (2) by means of a definite plan as a goal toward which to work, the householder may proceed step by step.

### *Serial electrification promising*

Ensemble selling of a kitchen will doubtless have limited application. There is no limit to the second method. It calls first, for the electric refrigerator; then, the electric range or water heater or both; then, perhaps, the cabinet work, lighting and decorative effects; then the miscellaneous other appliances; but every move will be according to a plan and the result will be a modern step-saving kitchen. Always the housewife has before her an unreached goal and money will not be diverted into other merchandising channels from the job of reaching it.

Logic of this method of procedure has best been demonstrated by the plumbing supply business. Remember the days of the old tin tub in the bathroom? It was an event when the old tub was replaced by the cast-iron one mounted on four legs. That was an individual sale. But plumbers learned rapidly and long since began selling bathrooms as a unit; equipment matching; walls and floors conforming to a color scheme. This is the outstanding example of ensemble-selling. The bathroom is a unit—not a collection of different pieces of equipment.

The National Kitchen Modernizing Program is endeavoring to apply the same line of sales approach to the kitchen. Realizing that a complete remodeling job is more expensive than many people can readily and immediately afford, the program stresses the importance of first establishing a plan, then proceeding along the plan until the desired results have been achieved.

### *Home owners first on list*

Three general markets immediately present themselves as those in which the heavy load-building appliances can be sold readily by putting into active use the slogan "Modernize—Electrify Your Kitchen." First is the individual home owner, who, now for the first time in many months, has some money to spend and cannot only be persuaded to spend it for immediate improvement in the kitchen but also can be sold the idea of planning the expenditure of

*Abstract of E.E.I. convention paper.

additional money, as available, for the completion of kitchen modernization in accordance with a definite procedure. Usually this buyer is the housewife. Usually she is a home owner. In some instances she may be an immediate home builder.

The second kitchen modernizing outlet is represented by blocks or groups of homes which, built six or more years ago as a building development, have found their way back into the hands of insurance or trust companies, have been rented by these agencies for as long a period as the property was in sufficiently good condition to be rented, and now must be thoroughly remodeled before offering them for sale in the nationally improving real estate market. You will find the insurance companies ready and eager to receive any help along the line of kitchen planning and modernizing. I know this to be true because of my personal experience in this connection during the last eighteen months.

The third market is a vast one. It is steadily growing, can be sold, but, if there is delay, will slip away without our realizing that it has been within our grasp and gone. I refer to the thousands of so-called "operation building" homes which are springing up like mushrooms in almost every section of the United States. Of the fact that these operation builders can be sold on modern electric kitchens, even when the houses that they are erecting sell for as little as five or six thousand dollars, there is ample evidence. I am told that in Washington, D. C., during the first year of effort modern electric kitchens went into 1,400 such homes. I know that in the last two weeks modern kitchens have been contracted for in nine building operations in the city of Philadelphia. On a single day 181 ranges were bought for such homes. Others are under negotiation. The job is surprisingly easy. I suggest that you try it.

### *Remodeling is accelerating*

Repairs and remodeling and building have been delayed so long that now that money is more plentiful, there is a rush to get these things done. It has been estimated that this year alone will see $5,000,000 spent on kitchen modernizing. A good proportion of this sum will be spent for appliances, the balance for cabinets, plumbing, wall and floor coverings. We feel very strongly that the timing of this activity could not be better, coming as it does on the rising tide of building activity.

The operation of the National Kitchen Modernizing Program activity is conducted by the Kitchen Modernizing Bureau of this association.

An executive committee composed of representatives of manufacturers, utilities and trade associations has charge of matters of policy; regional directors have been appointed and are functioning in all sections of the country; a planning committee has the responsibility for publicity and the outlining of campaign plans. The entire activity is under the direction of a paid staff located at E.E.I. headquarters and including traveling representatives, who, so far, have visited 60 cities in 26 states.

### *Fifty cities in six months*

But let me state most emphatically that, in spite of what may look to you like a somewhat formidable organization, the national bureau exerts and can exert only a guiding influence, acting as a co-ordinator of plans so that local bureaus or activities may gain maximum benefit from a program that is nation-wide.

Just how individual localities proceed is entirely up to them. There are many ways of doing this job and no one way will work in all sections of this country. There is always one best way for each community to proceed and that way is left to the community to determine. In some cases a utility-sponsored activity is best, whereas in other regions such an arrangement might produce unfavorable trade relations so that it would be a job for the local Electric League. Or, if there is no league, a committee of interested individuals may function as the sponsor. There is a wide range of choice in such matters and no attempt is being made to set a pattern to which all cloth must be cut. Suffice it to say that this activity can succeed as a national endeavor only if it is regarded as the summation of many completely autonomous local programs.

There are at present 32 local bureaus in active operation in as many cities, and fifteen more definitely to be formed, some of which by now are probably in operation. Yet the activity is less than six months old. There have been reported 84 electric kitchen displays in 28 cities and I believe we have only started.

## Roster of New E.E.I. Officers

**President**
**C. W. KELLOGG**
Engineers Public Service Company, New York

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**PAUL M. DOWNING**
Pacific Gas & Electric Company, San Francisco, Calif.

**J. E. DAVIDSON**
Nebraska Power Company, Omaha, Neb.

**J. G. HOLTZCLAW**
Virginia Electric & Power Company, Richmond, Va.

**A. H. KEHOE**
New York Edison Company, New York

**Vice-President and Managing Director**
**BERNARD F. WEADOCK**
New York

**Treasurer**
**F. H. NICKERSON**
Consolidated Edison Company, New York

**Assistant Managing Director**
**H. S. BENNION**
New York

**Secretary**
**MAE B. WOODS**
New York

**Trustees**
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Detroit Edison Company

**C. W. KELLOGG**
Engineers Public Service Company

**EDWARD REYNOLDS, Jr.**
Columbia Gas & Electric Corporation

**JAMES B. BLACK**
Pacific Gas & Electric Company

**JAMES F. FOGARTY**
North American Company

**THOMAS N. McCARTER**
Public Service Electric & Gas Company

**J. J. O'BRIEN**
Standard Gas & Electric Company

**H. HOBART PORTER**
American Water Works & Electric Company

**JAMES SIMPSON**
Commonwealth Edison Company

**HERBERT A. WAGNER**
Consolidated Gas, Electric Light & Power Co., Baltimore

**WENDELL L. WILLKIE**
Commonweatlh & Southern Corporation

# Continuing Inventories

## New Accounting Rules Necessitate Inventories of Utility Properties—Procedure in Appraisal Work Established at Low Cost

By H. B. GEAR*
Vice-President Commonwealth Edison Company

THOSE who have been through the process of making a physical inventory of a utility property are usually left with a distinct impression that if the disturbance caused in the regular work by such a process could be avoided by the establishment of a continuing inventory it would be worth while to assume the burden of expense entailed thereby.

It is but recently that any commission has formulated procedures which make possible a continuing inventory on a practical and workable basis. The New York and New Hampshire utility commissions have made it the duty of each utility company to set up an inventory of its property and to keep it in continuing basis thereafter.

In so doing they have recognized that an inventory of utility plants can be maintained by a suitable choice of "units of property" selected by the company to suit its own needs. Each of the various sizes of such an item as line transformers, for example, is to be enumerated under the one unit of property "Line Transformers."

"Minor items" are defined as those parts of the property which are associated with "units of property," but might be replaced separately.

Under the theory of making an inventory exact in extreme detail, it was not unusual to consume from six months to a year in making an inventory and appraisal of a large utility property. Under the practical theory an inventory based largely upon the operating records of the utility, together with a reproduction cost estimate, was completed for the property of Commonwealth Edison Company in about four months. The property has a value in excess of $300,000,000.

For operating, maintenance and general purposes the company has long maintained records of all major equipment in generating stations and substations, maps and quantities of underground conduit, length of feeder and transmission cables, number, size and age of poles, transformers, meters, and the like. The records of transmission and distribution items were spot checked by the engineers of the commission, and with slight adjustments found satsfactory for use as an inventory of these parts of the property.

The company employed consulting engineers to make a reproduction cost estimate on its own behalf and these engineers found the operating inventories so nearly accurate that they did not deem it necessary to make a new inventory, except that in the case of structures, the component elements, such as brick, concrete, steel and the like, were computed from architects' plans.

### *System to be perpetuated*

It was quite natural that a proposal to carry on the inventory on a continuing basis should be favorably considered. The matter was given intensive study in the light of current trends relative to inventories of property, with the result that it was found possible to initiate a procedure which would result in a practical record which could be set up and maintained at a reasonable cost.

There are two basic requirements of such a plan: (a) The selecton of units of property for practical use and (b) a job order routine adapted to report units and the cost thereof as they are added or removed. In this case the units of property were chosen to show all major items, leaving minor items to be embodied with the major item with which they are associated. In such items as switchboards, the unit consists of the entire assembly of items without listing the details separately. This also applies to control wiring, conduit for wiring and bus structures.

This resulted in ten units of property in the overhead plant, consisting, for example, of poles, arm assemblies, wires, arresters, transformers, services, transmission structures and miscellaneous. The underground conduit and cable system has 10 units, and the electrical plant in stations and substations is comprised in 20 units. The selection of units for mechanical equipment in generating stations and for structures are being worked out, and it is likely that the total number of units of property for the entire plant of the company will be from 75 to 80.

The job order routine is designed to co-ordinate the job order estimate with the report of the completed work in such manner that the estimate will be expressed in terms of units of property and the report will show the cost of installing each such unit. This report will be checked and certified by a representative of the department doing the work or supervising it, if done by contract. The engineer responsible for making the original estimate will also compare actual costs with the estimates and certify that the cost is reasonably stated in the report.

This report then becomes the basis of additions to or removal from the inventory records of the company and of the fixed capital accounting records.

*Abstract of E.E.I. convention paper.

The inventory record will be kept in the engineering department and will show quantities of units of property from month to month. The fixed capital record is maintained in the accounting department. Summaries will be drawn off once or twice a year for purposes of comparison.

### *Cost expected to be moderate*

The work of setting up the inventory sheets in suitable form for a continuing record is proceeding and will have required about twelve months' time when completed. The cost will not exceed 0.03 to 0.04 of 1 per cent of the plant investment.

The classifications of accounts as proposed by the National Association of Railroad and Utilities Commissioners and the Federal Power Commission include provision for continuing inventories as a required part of the records of every utility company. The units of property constituting such inventories are set forth in detail and seem likely to leave too narrow a range of flexibility to meet the needs of the case when applied to properties of various size and geographical distribution.

Success of the establishment of a continuing inventory can be realized only as it is based upon a reasonable expense for its maintenance. If regulatory bodies are convinced that a continuing inventory is ultimately to become a necessary part of the records of every utility company the requirement should initially be an optional one or should be otherwise arranged to provide for gradual introduction in order that experience may be gained before mandatory requirements are set up.

Initially, the regulations should set forth general principles and objectives. Details which would interfere with the acquistion of experience in different kinds of procedures in different properties should not be included.

# Edison Electric Institute Prize Awards

### *Charles A. Coffin Medal*

**Idaho Power Company, Boise, Idaho**
**K. M. Robinson, President**

*". . . for distinguished contribution to the development of electric light and power for the convenience of the public and the benefit of the industry."*

### *George A. Hughes Award*

**Kingsport Utilities, Inc., Kingsport, Tenn.**

*". . . for promoting the use of the electric range."*

### *Augustus D. Curtis Award*

**Metropolitan Edison Company, Reading, Pa.**

*". . . the greatest contribution to the advancement of artificial illumination."*

### *James H. McGraw Prizes*

**R. M. Hanson**
Northern States Power Company, Minneapolis, Minn.
"Circulation in Water Tube Boilers"

**Elwood A. Church**
Edison Electric Illuminating Company of Boston
"Operating of Oil-Insulated Transformers on a Temperature basis"

**Wallace C. Rudd**
New York Edison Company
"A Method for Checking Current Transformer Connections to Multi-Element Watt-Hour Meters by Use of a Portable Cathode-Ray Oscillator"

*". . . for the three most meritorious papers on any engineering or technical subjects relating to the electric light and power industry."*

### *H. M. Byllesby Prizes*

**H. D. Anderson**
American Gas & Electric Company, New York

**Charles L. Betts, Jr.**
Westchester Lighting Company, Mount Vernon, N. Y.

**Walter Bergmann and Henry G. Wingardner**
New York Edison Company

*". . . for meritorious papers on electric power subjects."*

**Honorable mention was given to August E. Munich and Chadd H. Chase, Brooklyn Edison Company, Brooklyn, N. Y.**

### *B. C. Forbes Prize*

**Louis F. Conti**
Westchester Lighting Company, Mount Vernon, N. Y.

*". . . for the most meritorious paper dealing with the subject of public relations."*

**Honorable mention to R. L. Laudenslager and A. C. V. Diehl, Brooklyn Edison Company; A. G. Mitchell, Philadelphia Electric Company; J. B. Ellsworth, Edison Electric Illuminating Company of Boston, and R. E. Kerns, Oklahoma Gas & Electric Company.**

### *A. L. Lindemann Prizes*

**Mayme E. Miller**
Minnesota Power & Light Company, Duluth, Minn.

**Edna Parrish**
Utah Power & Light Company, Salt Lake City, Utah

**Ruth Wilda Williams**
Detroit Edison Company, Detroit, Mich.

*". . . for the three most meritorious papers dealing with the advantages of electric cookery for domestic purposes."*

# Three Decades of Utility Selling Progress

## Three Eras of Pioneering, of Intensive Utility Selling and Co-ordinated Industry Sales Converge Into "Selling Our Way Out"

By C. E. GREENWOOD*
Commercial Director
Edison Electric Institute

I SUBMIT that the keynote of utility sales development was sounded in 1906, and that thirty years ago, and not three years ago, the electric utilities were fully aware of the import of the appliance load for increasing the value of the service and the earning of lower rates. Our Administration critics are "new" dealing in so many ciphers these days that the dropping of one might be forgiven under stress of circumstances.

The average domestic output in 1915 was 260 kw.-hr. per residence. Other than the range, which was still in the development stage with comparatively low-wattage units, there were no large current consumers that could be popularized. To be sure, 300,000 ranges had been sold in the United States up to that time, but less than half as many electric refrigerators. Unfortunately sales development in connection with electric cooking was in advance of the development of the range itself. It was still lacking in qualities necessary to compete with other cooking fuel on a large scale.

### *Era of intensive selling and expansion*

The second decade was an era of intensive selling and expansion. Total homes wired increased from approximately 5,800,000 in 1917 to about 15,300,000 in 1926, of which approximately 250,000 were in rural areas. Wiring costs were financed by private capital. There were no R.E.A.'s nor E.H. and F.A.'s to assist. Notwithstanding this 200 per cent increase in number of meter accounts, the energy output per home increased during the same period approximately 60 per cent, although we passed through the ravages of the World War, which engrossed the major nations of the Western World. The utility industry was attempting to beat off the ominous threats of the depression of 1914 when the conflict started. In 1915 the average energy output per home dropped from 268 to 260 kw.-hr. and during the war years made gains of but 3 or 4 kw.-hr.

There had been some realignment in distribution channels. New and approved electric household devices had made their way into the market, and new methods of volume production which required volume distribution and influenced high-pressure sales methods. The manufacturer looked out beyond the then accepted horizon of the electrical world and actively bid for the participation of the department, hardware and furniture stores as outlets for electric equipment. Many sold direct to the consumer.

The desire for a promotional offensive on a wide front was expressed in the initial program of the industry organized on a national scale. It was developed by a lighting educational committee, organized with utility leadership to promote better lighting in the home. The promotional expenditure in this movement was somewhat staggering from the viewpoint of the electrical industry, although modest in comparison with the advertising budgets of competing industries. During 1924 and 1925 advertising of the lighting educational committee, which sponsored the movement, appeared in twenty-one leading advertising media. The numerous forms of promotion created revolved around a Home-Lighting Contest, the prize being a $15,000 model electrical home. The undertaking grasped the imagination of the public, impressed the message of good lighting as then styled, and was an outstanding industry success.

### *Co-ordinated industry sales*

Executives were convinced now that there was no monopoly on household services. There was competition all down the line—the washing machine and ironer with the public laundry; the vacuum cleaner with the carpet sweeper and broom; electricity as a fuel with coal or gas; electric refrigeration with ice, or, of greater immediate importance, competition with no desire for refrigeration at all; competition of electric equipment of all kinds with automobiles, and, in general, dollars for electric equipment and service versus dollars for beautification and entertainment. Inter-industry competition was of paramount importance, and therefore mass selling activity was the call of the day.

But such mobilized industry promotion and selling demanded co-ordination, and to this end leaders in the utility association counseled, and after months of deliberation a commercial department was established at headquarters of the association. The home-lighting activity was a worthy yardstick

*Abstract of E.E.I. convention paper.

for determining the course of future selling.

This third decade has opened auspiciously. The scope of selling vision was extended. The manufacturers had helped to pave the way. The electric household refrigerator, practical models of which had been introduced ten years previously, had now proved itself. Statistics tell us that 150,000 had been manufactured up until 1926 (including exports), and had not the World War dawned upon us development would have been much more rapid. The refrigerator rendered a particularly valuable service to the user and was ready for intensive development. It would more than double the national average consumption at that time.

But a market survey assured that the majority of American homes did not use refrigeration of any kind, nor were housewives convinced of its necessity. A national campaign of education and information was essential. A plan was therefore organized, and carried through jointly by utilities, manufacturers and other groups interested in the protection of foods, to establish a definite ice box temperature for adequate food preservation and to sell the idea of all-year-round refrigeration. The accomplishments of the National Food Preservation Council are a matter of record. The groundwork was laid for the next step in the development of the electric refrigerator load; that is, the aggressive selling of electric refrigeration service.

The progressive step followed with the organization of the Electric Refrigeration Bureau. It was headed by J. E. Davidson, past-president of the National Electric Light Association and president of the Nebraska Power Company. It continued to function for more than three years, making a record unsurpassed in promotion and selling. Again the mobilization of utilities, manufacturers and other selected groups, national and local advertising, and the powerful force of co-operative and co-ordinated action scored a triumph, and produced a background for amazing sales volume of electric refrigerators. The momentum created carried sales forward during the recent years of economic upheaval despite reverses in practically all other industries.

The onward march of utility sales development over three decades now climaxes in established national co-operative sales programs as the most far-reaching and effective method of gaining attention in the market-place for specific electric services. Expressions of this thought are the Better Light-Better Sight, National Kitchen Modernizing, Electrical Housewares and the Running Water programs, all motivated by Edison Electric Institute and all in action at this time. Passing mention only is made of these because they are all familiar to you and speak for themselves.

### *Government sales*

The marketing policy of our government competition is based primarily on the low-rate influence on volume sales of equipment. Granting this gamble works to a degree, and can be tried when money comes easily, low rates in themselves will not produce the cherished goal of complete home electrification and complete contentment with the rate. It is an officially recognized fact that the electric consumers of the states of Oregon and Washington have the highest consumption per capita and the lowest rate per kilowatt-hour in the United States. Yet in these days, when electric rates are serving as a political football, it is not unusual for customers, even in this region, to join in the game and take a kick at it.

Now every cloud has a silver lining. From a marketing angle we find an item of large interest on the plus side. Let me say this: Our government sales competitor has made a stupendous contribution in publicity for domestic electric service. I would not attempt to estimate the amount of money that has been spent by the electric utility industry in promotion and advertising over past years. However huge this sum may sound, it was not enough. Every square inch of that newspaper advertising telling the householder of the true value of electricity in making the home a better place in which to live, radio broadcasting, volumes of printed literature, all have been paid for in the advertising budget of the utility; the Post Office Department has been enriched from mailings, and all have been charged to the cost of rendering electric service. It is the only way out for private business.

### *Stimulated public interest*

But under the caption Political News thousands of column inches carrying this same electric service message have been emblazoned for our competitor in the newspapers *free*—often on the front page, where space comes high. To be sure, people have been made "rate" conscious at the same time, but the voters cannot be made rate conscious without telling them also "what all the shooting's about."

Fuller use of domestic electric service in 21,000,000 homes in the United States is still our greatest potential opportunity for service and profit. How warped our marketing judgment would have been had we not grasped this opportunity to gain every advantage from this wave of accelerated public acceptance that results from the impressive and expansive promotional campaign that our competitor wages in synchronism with our efforts!

I urge that we meet competition of all kinds with *more business*. We can sell our way out of many of our difficulties. The public can know the value of electric service only through widest use. Intensive sales development must be focused on each major service. The radio musicale with an occasonal announcement of what good fellows we are will not do our selling job. The most attractive four-color advertising campaign in every national medium in the country would not be effective with a *general* message of electric service values. It would be nullified by a combination of municipal, state and federal anti-private utility political propaganda now universally rampant. I repeat, it will be more effective to shoot at bull's-eyes, each a specific service that the housewife should want. This we are attempting in our national programs.

The last decade has unfolded greater executive interest in business building than ever before. Let it permeate to the office boy. And then, why not augment selling forces to include every dealer in electrical appliances and equipment? Inspire them to join in local profit-selling plans with wholesalers and manufacturers in order that the greatest number of consumers will be sold on more abundant household electric service.

Chief executives of our industry! Give your commercial executives the money for promotion and selling of equipment and service commensurate with other private industries; likewise important, give them your personal support and share their spirit of optimism, and you may be confident that many of the obstacles that now lie in your path will be surmounted to your honor and profit.

# Contributions to the State

## A Factual Example of Utility Contributions to Oklahoma — A Call to Arms to Combat Socialism — Reorganization of E.E.I. Suggested to Carry Out Program

**By J. F. OWENS***
President, Oklahoma Gas & Electric Company

THE electrical industry really began with Edison's Pearl Street station in 1882. We might go on with the researches that led to the knowledge of the importance of a 24-hour load and the recognition of the wastefulness of small individual plants. Could we gather together an estimate of the energy, the time and its value in money; in research resulting in inventions and the application of the resultant discoveries; innovations, thought and energy devoted to increased sales, which demonstrated the immutable economic law of increasing returns, the figures would be astounding, even in these days of billions.

It is significant that in all of these developments, the part played by governmental agencies was nil. The realization of the value of interconnection and the resultant scrapping of small municipal plants might be considered the second great phase in bringing about the application of electricity to the improvement of social standards in which our industry has played and is playing such an important part. Our industry has doubled the volume of its total output once in every seven years, resulting in a decrease in the sale price of residential service from 25 cents per kilowatt-hour in 1882 to an average of 5 cents per kilowatt-hour at present. The reduction in the sale price since 1915 has been 40 per cent, in spite of a general rise in all industry costs, including about 150% increase in wage rates.

It is my purpose to use as an illustration of electrical contribution factual information concerning the development of one company, which I believe to be typical of what has happened in hundreds of cases throughout the United States. This company had its beginning in 1902. With the help of a strong holding company which enabled it to broaden its activities and to bring the results of the demonstrated advantages of large central stations and interconnection to the towns, villages and communities in its territory, it has back of it the following record:

(a) Local distribution systems have been constructed in 85 communities where no electric service previously had been furnished.

(b) Local distribution systems were purchased in 138 communities, of which 112 were from private interests and 26 from municipalities.

(c) Of the 138 communities acquired by purchase, seven were receiving only limited hour service. Today they are obtaining electric service as complete as that in any metropolitan center of the country.

(d) Transmission line service was immediately made available in the 85 communities wherein the company constructed the local distribution system.

(e) In 129 of the 138 communities wherein the distribution systems were acquired substantial rebuilding of the systems was required to insure adequate service.

(f) Distribution extensions were made immediately in 110 of three of 138 communities to serve customers who, because of high rates, unreliable service, or perhaps for other reasons, had not availed themselves of electric service.

During the year following acquisition by purchase from private owners domestic rates were reduced in 84 of the 112 communities, the reduction ranging from 10 to 50 per cent and averaging 22 per cent.

During the first year following acquisition from muncipalities domestic rates were reduced in 22 of 26 communities, the reduction ranging from 10 to 50 per cent and averaging 22 per cent. During the year following the inauguration of electric service and the establishment of standard rate schedules by this company 40 communities received rate reductions, averaging 17 per cent.

In every instance the properties acquired from municipalities were found to be of poor design, obsolete, inadquate and in such run-down condition as to require substantial or complete rebuilding. Under the improved service and correct rate schedules the domestic consumption has increased throughout these communities by amounts ranging from 50 per cent to over 500 per cent, and domestic customers' bills in the communities have been reduced approximately 35 per cent.

Following the bringing out of complete electric service to small towns, communities and hamlets throughout the territory, a well-planned and aggressively promoted action was taken, which today has covered a period of ten years, to extend service to tract

*Abstract of E.E.I. convention paper.

dwellers and farms within the territory served. Today 2,436 dwellers on tracts and 620 farmers enjoy complete 24-hour service at reasonable rates with profit to the dwellers and to those residing on the farms.

These far-reaching social and economic advantages in the numerous small cities and rural communities is the contribution of one, and I believe is typical of all, far-flung public service operating companies. We have a right to be proud of this record. I submit the question: Could political management have made this possible?

### *Private vs. municipal rates in Oklahoma*

Sixty-one towns in Oklahoma are still served by municipally operated systems.

Taking our company as a basis and grouping the communities by population, with weighted averages, we find the following results as reported by Federal Power Commission Residential Electric Rate Survey January 1, 1935.

Before allowance for taxes, residential electric rates in municipal plant towns in the same size communities in Oklahoma average from 5 to 35 per cent higher than our company, as follows:

| | 25 | 40 | 100 | 250 |
|---|---|---|---|---|
| | ——Kw.-Hr.—— | | | |
| Municipal higher, per cent ..... | 6 | 5 | 29 | 35 |

After allowance for taxes on the basis of taxes paid in towns of similar size the weighted average difference ranges from 20 to 55 per cent, as follows:

| | 25 | 40 | 100 | 250 |
|---|---|---|---|---|
| | ——Kw.-Hr.—— | | | |
| Municipal higher, per cent ..... | 22 | 20 | 48 | 55 |

This is an absolutely fair and honest comparison, as we have included only those communities in size which have municipal plants, and have not averaged our larger communities above 25,000 population, which would reduce our average giving us an even more favorable showing.

It will be noted that the difference is greatest in the higher consumption blocks—the segment of usage upon which the federal goal of an "electrified America" depends. Thus, it is evident that our contemporary public ownership friends have neglected this aspect of the business.

There can be no doubt that interconnected service is more reliable. Thus, in addition to the cities, the smaller communities now enjoy 24-hour reliable service at lower cost.

### *Electric service widely distributed*

May I give you some typical service statistics of my own state?

(a) 91 per cent of the incorporated communities in Oklahoma have electric service, 85 per cent of these communities are supplied exclusively by private interconnected systems.

(b) 98 per cent of the people in Oklahoma living in incorporated communities have access to electric service, 87 per cent of this service is supplied exclusively by private interconnected systems.

(c) 93 per cent of the incorporated communities in Oklahoma under 300 population have electric service; 90 per cent of such communities are supplied by private companies.

(d) In addition, 106 unincorporated communities in Oklahoma have complete electric service; all supplied, of course, by private companies.

What of the national picture?

(a) Every town or city in the United States over 1,000 population has electric service; 82 per cent of such towns are served exclusively by private companies.

(b) 99.7 per cent of the total population in the United States living in incorporated communities has access to electric service; 88 per cent of this population is served exclusively by private companies.

(c) 90 per cent of the incorporated communities in the United States under 1,000 population have electric service; 92 per cent of these communities are served exclusively by private companies.

This is the achievement of the American electrical industry under the impetus of private initiative. It is not a governmental achievement. The contribution of government to this record is negligible. The record looms high in our national, social and economic progress.

The electric power production in the United States has increased 110 per cent since 1920, or more than doubled. Electric power production in Oklahoma has increased 250 per cent since 1920. Both the national and the local achievements have come almost entirely from interconnected private systems, and not T.V.A.'s.

The social and economic implications of this electrical progress are inspiring. Socially, it means a higher standard of living, shorter hours, better wages and greater output at lower cost.

The query may well be made, in view of this national record and in view of the records of operating companies throughout the country, why does the present Adminstration insist on pushing its program for the socialization of the electrical industry?

On March 11, 1927, according to a report made by H. S. Raushenbush, a meeting was held in the office of Senator Norris in Washington. The purpose of this meeting was that of discussing the reasons which prevented the advance of Socialism in America. According to Raushenbush's report, the tenets of Carl Marx and Engel were discussed. Direct action was felt to be impossible in America. It was the consensus that a beginning should be made in the socialization of all natural resources, and probably because the industry is well set up, electrical companies were selected as the first line of attack. Read the report of this meeting. It is found in the Red Book, published by the National Electric Light Association, in exhibits offered to the Federal Trade Commission.

Is any thinking man so credulous as not to believe that the present program has as its objective the socialization of all natural resource industry and eventually the socialization of all industry? But it will do little good for you and me to read papers before a group of men who are already probably more familiar with the facts than I. It will do very little good for us to listen to facts that prove a remarkable record on the part of this industry in the advancement of civilization.

Presenting facts before legislative bodies is necessary; it is good in so far as its effects goes, but legislators are elected by and responsive to what they think is the will of the people. The masters of America are still the rank and file of the people of these United States. They live on the farm, they work in the factory, they clerk in the stores, and it is they to whom Congressmen and Senators are constantly listening. A vast majority of the people in America are not Socialists. I think it safe to say that a vast majority of the people in America abhor the thought of Socialism. They will act, if they have the facts.

### *Facts must be personalized*

The question of distribution of material things, of goods and wares has been given much thought and much

study. What is needed today is that the best minds of our nation be devoted to the matter of distribution of factual information. It is not enough to write articles; they may or may not be read by the people at the grass roots. It is our job to get these facts over to the men who would use them if they were available. While the facts may be produced by outstanding authorities, they must be personalized in their distribution. They must come from those whom the men at the "forks of the creek" know and believe. In our case, they should be distributed by the operating personnel; through paid advertisements over the signature of the division, district or local manager. The "folks" know him as a law-abiding, responsible citizen. They have learned to believe him, because he deals only in facts.

To my way of thinking, there should be set up in the national organization a fact finding agency, with men of ability to gather these facts and promulgate them in language easily understood. Nothing but facts will suffice.

I speak now my own sentiments only. I have not conferred with any one. Our national organization should be changed. The geographic divisions should be restored. The heads of the geographic divisions should be members of the board of trustees. The operating committee, as such, should be abolished and suitable committees substituted, making it possible to produce facts for distribution. Headquarters should send out to operating companies factual information in the form of suggested advertisements, which may be taken and used or revised by the expert men in each operating company to suit that particular operating company's conditions.

Members of this organization, we are in the front line of attack. We are the first. Other businesses will follow. Since we are bearing the brunt of the attack, it behooves us to use facts as weapons, and facts—if properly presented—will prevail. In our hands, in a great measure, rests the destiny of America. In my humble judgment, whether our children and our children's children live in a land of unrivaled opportunity, as have you and I, depends in a great measure on us. No nation, in an equal time, if I read recorded history aright, has made such progress as ours. It is for you and me to determine whether we shall continue to live in the "land of the free and the home of the brave."

# Attic Ventilation Sells

## Home Cooling Can Be Done Well by Attic Ventilation — Methods to Use and Results Cited

**By W. G. MOORE***
Commercial Manager Texas Power & Light Company

HOME cooling by attic ventilation is most effective for night cooling, being limited for daytime use, at least in hot climates, to merely adding that comfort which results from air movement and ventilation. The advantages of this method of cooling are:

1. An excellent job of cooling and of ventilation.

2. Low cost of equipment and installation, as well as low cost of operation. (Installation cost varies from $200 to $350 for an entire house.)

3. Simplicity of operation which can be made automatic by adding an inexpensive time switch.

4. The inconsequential costs of repair and maintenance of the equipment.

5. Flexibility of operation in that it can be used to cool and ventilate a single room or the entire home by simply opening and closing windows and doors.

6. Elimination of the expense and necessity for providing sleeping porches in new homes. Every bedroom is in effect a sleeping porch in the homes that have home cooling by attic ventilation. The cost of a cooling system adequate for the entire home is less than the construction cost of a single sleeping porch.

7. Making possible the use of attic space for playrooms or for other purposes.

Our experience has pointed out very plainly and definitely that the application of this method of cooling has not advanced to the stage where it can be sold in a standard package. To prevent setbacks in its introduction into communities each case should be studied carefully by a specially trained sales engineer, or the equivalent, to insure:

1. Adequate fan capacity to give

a complete air change in a one-story house of at least once a minute. In two-story houses the air change should be at least once in 1½ minutes.

This is considerably higher than the rate of air change recommended by some engineers and some manufacturers. Tests conducted at the University of Illinois research residence at Urbana, shows that maximum cooling effect can be obtained when the air is changed once in two minutes. Our experience, however, has proved the larger capacity to be essential for central Texas climate. Our reason for recommending the use of fans of larger capacity is to create an air motion of sufficient velocity to reduce the effective temperature during the daytime and the early evening hours.

(With air moving at the velocity of 500 ft. per minute, the effective temperature is reduced approximately 6 deg.)

2. Proper location and design of grilles and attic outlets. With the type of construction existing in the Southwest, we have found it necessary, in most cases, to use a single centrally

*Abstract of E.E.I. convention paper.

located suction box, through which the air is drawn from the rooms and exhausted into attic space. The pressure built up in the attic space forces the air through louvered openings to the outside.

Grilles and outlets should be designed for a "free" air area sufficient to allow an air velocity not in excess of 800 ft. per minute.

3. Quietness in operation. Consideration of this is of utmost importance in selecting the fan and in designing the installation of the system. Since the speed of the fan blade is the most important factor in determining the noise of a fan, low blade speed is essential. In order to keep the cost to a minimum consistent with good efficiency, we have used and recommended the use of a belt-driven unit, with standard high-speed motors.

The power consumption of installations in use on our system ranges from 300 to 400 kw.-hr. per season. Since most of those purchasing cooling systems are already liberal users of electric service, the added energy consumption is usually on the lower steps of the rate schedule, which makes the annual cost of operation range from $12 to $15.

### *Merchandise as a package*

If all new homes were provided with grilles and with louver outlets in the attic, the sale of this system of cooling would be greatly simplified, because it could then be merchandised as a package job. The big market for this system of cooling is, of course, in existing homes where we find all types and kinds of houses, making each installation an individual construction problem requiring accurate cost estimates before a price can be quoted. As we have more experience in making installations, it may be practical to classify buildings into some three or four general groups, according to type, and make a flat price for each class of homes for a complete installation ready to run. This will greatly simplify the sales problems. Where the utilities sell only the fan and depend on the carpenter contractor or other tradesmen to make the installation, many complications arise which make the closing of the sale slow and difficult. On account of the amount of construction work to be done, the cost of which is from 33⅓ to 50 per cent of the cost of the fan, and on account of the need for specialized mechanics in making an installation the sale of the equipment seems naturally to belong in the hands of specialty dealers.

In the initial stage of the development, however, the utilities may find it necessary to sell and install the equipment, as we have done, because dealers cannot be found who are willing or who are financially able to bear the cost of promoting the sale of the first few units, in each locality before there is a general enough acceptance of the idea to make sales profitable.

As an aid to sales, it may interest you to know of a scheme we use. This proposition is plainly a case of "seeing is believing." One installation to which the public has access is worth many, many pages of advertising or salesmen's talk. Our company operates through 34 separate districts, each of them under the supervision of a local manager. We proposed to our managers that if they would equip their homes at cost with this system we would allow them $1 per demonstration; that is, for every prospect whom they reported as having been taken through their homes and shown the workings of this system we would credit them $1 on their account. I am telling you this as a hint of one means of providing demonstrations. That a demonstration is the best selling agent can be verified by innumerable instances.

The proof of worth is the value placed on an appliance or service by the user. Of more than 150 installations of home cooling by attic ventilation on the system of the Texas Power & Light Company we have 100 per cent customer satisfaction. Without exception the users will indorse this method of cooling and will recommend it to their friends.

# C. W. Kellogg New President of E.E.I.

**Biographical Sketch**

Charles W. Kellogg has devoted his entire business career to the public utility industry. One of the younger group of leaders, he has served since his graduation from the Massachusetts Institute of Technology, in 1903, with Stone & Webster and affiliated organizations, acquiring an unusual breadth of experience in the three main branches of the utility business—operating, engineering and finance. Since 1934 he has been chairman of the board of Engineers Public Service Company. Previously he had served as president of the same organization almost from its formation in 1925.

Mr. Kellogg was born in Philadelphia February 27, 1880. After graduation he began work with Stone & Webster, becoming manager of the Edison Company at Brockton, Mass., in 1905. Subsequently he spent nine years in Texas, at various times, serving as manager of the electric light and power properties in El Paso and in the Gulf Coast region. His experience in operating utility properties was further enhanced by service at Keokuk, Iowa, where from 1914 to 1919 he was manager of the Mississippi River Power Company. During the latter two years he was also manager of the Middle West district for Stone & Webster.

He returned to the East in 1919 and for the next six years was located at the Boston office of Stone & Webster, being engaged in expert work on reports, appraisals, etc., including work for the Interborough Rapid Transit Company and the Conowingo project on the Susquehanna River. In this period also he had charge of organizing and conducting local securities sales campaigns for operating companies. Since going to New York in 1925 he has won recognition throughout the industry for his exceptional qualifications in utility leadership in matters of both administration and policy.

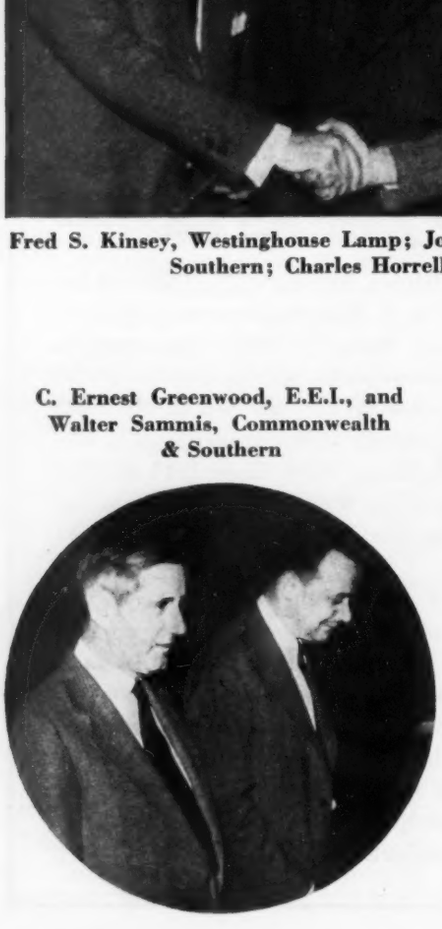
E. W. Lloyd, Commonwealth Edison; J. D. Noyes and Glen Coley, Detroit Edison

G. R. Trumbell and Dr. G. W. Allison, Edison Electric Institute; M. E. Skinner, Niagara-Hudson

Fred S. Kinsey, Westinghouse Lamp; Joseph Langdell, Commonwealth & Southern; Charles Horrell, Sangamo Electric

J. F. Fairman and L. B. Bonnett, Brooklyn Edison

C. Ernest Greenwood, E.E.I., and Walter Sammis, Commonwealth & Southern



A. S. Bennion, Utah Light & Power; W. S. Finley, American Water Works; G. M. Gadsby, Utah Power & Light

# New Developments in Farm Wiring

## Rural Prospects, Last Major Frontier, Can Be Served With Safe, Economical, Approved Wiring for House, Yard and Buildings

By A. E. BRAND*
Commercial Engineer,
Niagara Hudson Power Corporation

TYPES of rural customers and conditions encountered in rural electrification the country over, naturally, are widely varied. However, when certain problems are eliminated, such as power uses for irrigation and rice growing, and the sharecropper and cotton farmer of the South, all of which are highly special, it is found that the remaining types of farms have electrification problems which, to a great extent, are fairly similar, regardless of location. Among these are dairy farms, poultry farms, truck or produce farms, fruit farms, crop or grain farms and general farms combining the characteristics of several of the above. The problem of electrifying the group of buildings on any of these resolves itself into:

(a) Wiring the house for lighting and for the usual appliances, including a water pump.
(b) Wiring the outbuildings for lighting and for various farm equipment applications, depending on the nature of the farm.
(c) Supplying a yard distribution system which carries power to each building and supplies yard lighting.

Endless lists of rural uses of electricity are available and nothing would be gained in reviewing these. Similarly, a detailed analysis of the electrical design problems peculiar to each type of farm is impracticable. Hence this discussion will cover such general factors as economy of materials and methods, adequacy of the installation, and similar items that affect the customer's pocketbook as well as utility revenue. While these details may contain many technicalities, the problem should have executive interest because of its important bearing on the prospects for making rural lines pay their way.

There are many reasons why we should concern ourselves with the wiring and equipment problems of our new rural customers:

1. The sale of lighting and of appliances is facilitated by complete wiring, and seriously hampered by inadequate wiring.
2. These new customers who, in most cases, have only a limited supply of funds available, know nothing of the wiring required and frequently very little of the agricultural uses of electric service.
3. Electrical loads to be wired for in the country are heavier and more diversified than in the city. The city contractor frequently is not familiar with rural conditions and the rural crossroads contractor is frequently ill equipped to act as an unbiased and intelligent consultant, as he is operating under competition and, often, with a rather meager equipment of business fundamentals.
4. If the farmer is properly guided, he may secure more outlets and heavier copper for the same investment, or may buy an adequate installation at less expense, thus leaving a greater portion of his total funds for appliances and equipment.
5. The days of the old house-wiring campaigns when six-room residences were wired complete with drop cords for $21 are now a sad memory. Rural electrification in one sense is another old house wiring campaign, but with trimmings of electric ranges, 5-hp. motors, henhouse lighting, soil heating cable, milk coolers, I.E.S. lamps, and the like. These new customers should have the benefit of experience over the years so that they will not cause us similar regrets ten years hence.
6. Two recent investigations of the cost of farm wiring and equipment, one on the west coast and one in Massachusetts, indicate that for a 600-kw.-hr.-per-year customer wiring alone may average from $100 to $112.50, while for a 2,000-kw.-hr.-per-year customer the costs may average from $170 to $325. Examples could be cited where wiring costs have exceeded $900. Such investments represent a serious problem to the majority of our new customers and deserve guidance from the utility.

This aid should should further the following objectives:

(a) Use of the lowest unit cost safe materials.
(b) Adequacy within the customer's means.
(c) Assurance that the wiring contract is fulfilled.

### *Use of the lowest unit cost safe materials*

The question of wiring materials covers a wide field, filled with tradition, commercial rivalries, contractor inertia and, all too frequently, with deplorable ignorance or indifference on the part of the utility.

To say that wiring in all cases should be in accordance with the requirements of the National Electrical Code as interpreted by the local enforcement agency is not sufficient as the question of cost for equivalent materials enters.

Knob-and-tube work is highly satisfactory for farm buildings and its use should be encouraged. In the many sections of the country, however, where its installation has become practically a lost art the use of non-metallic sheathed cable should probably be urged.

Whereas armored cable may be used only in dry locations, non-metallic sheathed cable may be used in every part of a farm building, whether moist wet or dry, and is prohibited only outdoors and underground. In addition to outlasting metal systems in buildings which are sprayed or where

*Abstract of E.E.I. convention paper.

cattle fumes are prevalent, the outer sheath, being non-metallic, cannot carry voltages sufficient to be fatal to cattle, as may happen when the "hot" conductor in a metal-clad system accidentally contacts the armor and high resistance prevents blowing a fuse to clear the circuit.

There is now available a simplified non-metallic assembly, known by various names as "Protected Neutral Cable" or "Type CNX," and others.

This material, which initially is priced about 17 per cent under standard non-metallic cable, is intended for branch circuit and feeder work and has just recently been approved by Underwriter's Laboratories for "trial installations." Its use is not yet recognized in the Code but it may be installed by special permission of the inspection authority. The neutral or grounded conductor is uninsulated, but a non-metallic over-all braid prevents it from coming in contact with grounded objects or surfaces. Hence, it will not give rise to stray currents.

Protected neutral cable is an important development in wiring technology and one that deserves the hearty support of all utility companies. Uninsulated neutral conductors, commonly referred to as "bare neutral" or "concentric wiring" have had a long and stormy history, caused by commercial jealousies and by a smoke-screen of thinly grounded technical distrust thrown around the system by selfishly interested or poorly informed groups. Due to the use of the non-metallic outer braid on the new assemblies, all valid technical objections to uninsulated neutrals disappear.

In addition, manufacturers of wiring devices are now developing a complete line of self-contained convenience, switch and fixture outlets for use with the new assembly, which will eliminate the usual steel switch or outlet box. It is hoped that they will be available later this year.

### *Code has been liberalized*

It will be well to examine the National Electrical Code and to identify and place into effect locally some of the liberalizations that have been introduced in recent years. They produce savings in cost of material per foot varying from 25 per cent to more than 70 per cent. Among these are the following:

1. Uninsulated-neutral service entrance cables in place of conduit.
2. Service cable (type SD) as a feeder to an electric range.
3. An uninsulated No. 4 copper wire as a common grounding conductor.
4. The use of non-metallic cables as motor circuits.
5. Non-metallic surface extensions for convenience outlets.
6. The use of "combination range switches" in house and barns.
7. Pole meter installations where several buildings with appreciable load are to be wired.

It should be the aim of each local operating group to place such modern low-cost wiring practices into use in its area. To do this it frequently becomes necessary to mold local electrical opinion into new ways of thinking and it is essential actually to assume a position of friendly leadership in this phase of the electrical business.

The service entrance is of prime importance. Every kilowatt-hour used on the farm passes over the entrance wires and through the main switch. They should be large enough to take care of inevitable future growths in load as well as initial modest demands. In no case should the main service be of less than 60-ampere, three-wire capacity, and many farms require 100-amp., three-wire services.

### *Assurance that wiring contract is fulfilled*

It is not sufficient merely to recommend certain construction materials, or copper and switch sizes, and a certain number of outlets; these actually must be specified to the wireman. If no definite plans and specifications are available on which the wiremen may base their cost estimates, it will be found that the successful contractor, in practically all cases, has figured on a less complete job than did the unsuccessful bidders.

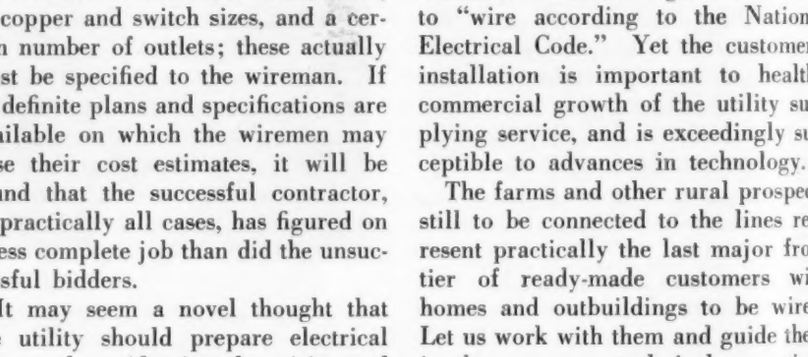
It may seem a novel thought that the utility should prepare electrical plans and specifications for wiring and lighting a farm and yet the operator of every dairy farm and poultry farm, at least, should have the benefit of this service. Such a plan is now in use by companies in upstate New York, utilizing simple forms and a routine development by a committee of the Empire State Gas and Electric Association. Not only is it a profitable venture from the long-range load-building standpoint, but it is an excellent means of building customer good-will and appreciation. In addition, it aids in securing quick acceptance of low unit-cost wiring materials.

Another step that has been taken in certain localities consists of an inspection, at no cost, by the fire underwriters' representatives or company inspector, as the case may be of the completed wiring installation for compliance with the plans and specifications previously prepared. This is a service appreciated by the customer.

### *Farmers need guidance*

May I make a plea for an aggressive attack on this stuation. To do so necessitates becoming versed in a complex technical problem that all too frequently is indifferently cast aside or dismissed with the vague admonition to "wire according to the National Electrical Code." Yet the customer's installation is important to healthy commercial growth of the utility supplying service, and is exceedingly susceptible to advances in technology.

The farms and other rural prospects still to be connected to the lines represent practically the last major frontier of ready-made customers with homes and outbuildings to be wired. Let us work with them and guide them in the necessary technical operations to the mutual benefit of company and customer.

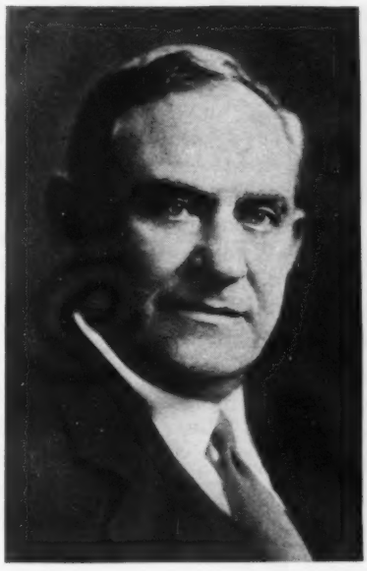


D. K. Blake, E. F. Whitney, R. C. Hardy, all of General Electric

# Air Conditioning Here

## Now a New Service to Sell — Standard Products Are Available for a Wide Market — Experience Shows How to Promote and How to Sell — An Example From the Field

By C. E. MICHEL*
Vice-President
Union Electric Light & Power Company



THERE are few modern developments in the electrical field that touch the interests of the utility at as many points as does air conditioning. The basic consideration justifying the utility's participation in developing this business is, of course, the opportunity it presents to open up a broad new field for the sale of energy, but when, in fulfilling our obligation in this respect, we, at the same time, render a service to our customers that earns an exceptionally high degree of appreciation, we are confronted with an opportunity worthy of our best thought and effort.

Our confidence in air conditoning has been rewarded. During the past twelve months we have picked up more than 5,000 kw. of air-conditioning load, and that in a period when 5,000 kw. loads were not any too common.

Self-contained air-conditioning units are available at prices relatively lower than were refrigerator prices at a corresponding stage of the refrigerator's acceptance. That in itself indicates that air conditioning is no longer a mere potentiality. It is a reality in a relatively advanced stage of acceptance.

The whole range of our experience with domestic appliances is applicable; so, too, is the promotion that has been successful in the commercial lighting and power fields. It calls for the selling of personal comfort and well-being, and it will respond to the appeal of trade stimulation. It can be sold in terms of increased industrial efficiency, which has long been the keynote of our industrial power sales.

But summer air conditioning has one advantage possessed by few of its predecessors in the electrical field. It is not being sold to supplant some less effective means to the same end, as were most of the appliances whose popularity we have helped to create. It is a new service to humanity, a contribution to the comfort and well-being of those who make use of it.

We are dealing with a practical and proven product, using long-established principles. Ventilation and air circulation are old arts. Air cleansing and humidification are familiar processes. Heating problems are thoroughly understood. Air conditioning applies these fundamentals in a new way perhaps, but nevertheless it is backed by our long experience in all of these services and is firmly founded on established principles.

The related field of ventilation provides an opportunity to capitalize further on the growing public consciousness of the condition of the air in which they live. This year, I believe, will be a banner year for the exhaust fan.

Nor is the market confined to any single class of customer. Homes, stores and factories alike are prospects. The domestic customer weighs the cost against the benefits of personal comfort and health. The store and restaurant justify the investment on the basis of increased patronage, while the factory pays for it through increased productive efficiency and quality of product.

Finally we are not greatly restricted to any particular income level. Consider again the close analogy with the electric refrigerator, which has gained saturations well over 50 per cent by finding users in almost every income bracket. The air conditioning field is a broad and open one.

To create a widespread use of air conditioning, we must sell health and comfort in the home and office. We must convince the merchant and the restaurant owner that in commercial establishments it pays by attracting more customers, increasing their interest, and stimulating salespeople to greater activity. We must be able to prove to the factory owner that air conditioning often facilitates his manufacturing processes, improves his product, and that its effect on his employees stimulates efficiency.

During the last six years utilities throughout the country carried on substantial promotion activities, the results of which are being increasingly felt. Now, with business conditions improving, and with a broad public acceptance of air conditioning, we face what gives every indication of being a banner year.

I cite our local experience as an example, which, I am told by manufacturers, reflects the general progress being made throughout the industry. In January, 1933, we were serving 91 installations, with a total load of less than 5,000 kw. By January, 1934, this had grown to 171 installations, with a load of approximately 5,600 kw. By January, 1935, the number of installations was 321 and the load slightly in excess of 6,600 kw. In the following sixteen months 251 new installations were made, with load of 6,527 kw., practically doubling the air-conditioning load on our lines.

*Abstract of E.E.I. convention paper.

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## *T.V.A. Comes to Showdown*

NINETEEN public utilities have joined in a legal battle to test the constitutionality of T.V.A. This suit comes after all endeavors to negotiate have failed. It was forced upon the utilities by the decision of T.V.A. officials, supported by the Administration.

We had already suggested that these private utilities get together and offer to buy the T.V.A. power at the dam site on more than fair terms. It is apparent that all such offers by the utilities were refused by T.V.A. officials, who take the position that they are under a mandate to go ahead without regard to any existing utility rights or investments. In a nutshell, they will put the utilities out of business if they can, because that is the way they interpret the law, and those are their orders from above.

It is also apparent that an appeal for co-operation instead of confiscation made to the Administration in Washington was in vain. All offers were rejected, it is reported.

We surmise that two basic conditions exist that forced this T.V.A. showdown. T.V.A. officials dare not move because Senator Norris appears to be their big boss, and he, as is well known, is an ardent advocate of public ownership. The other is a combination of politics and vindictiveness. It is apparent that President Roosevelt and Secretary Ickes are antagonistic to the utilities, if not in complete accord with the public ownership program of Senator Norris. Also, this is an election year and the Administration will do nothing to alienate Senator Norris and other radicals. Therefore it was considered good politics to play T.V.A. across the boards as it is now operating.

What could the utilities do? They were willing to go to extreme limits, to buy the power, to carry out the electrification program, to bring about the abundant life in the region. But their offers were spurned. And T.V.A. is speeding up its propaganda and power program. It is invading cities outside the area. It is surveying lines and planning to enter into direct competition on a big scale without any consideration for existing utilities. In self-defense, the utilities have had to act. Individual action meant weak and expensive defensive measures. Joint action adds strength and reduces costs.

No one can read the record of the T.V.A. without coming to certain conclusions. The first is that the T.V.A. was planned and is operated as a direct endeavor to put private utilities out of business. Another is that the private utilities were more than fair in their endeavor to co-operate and play ball with T.V.A., but that their offers were never accepted with any degree of sincerity, that T.V.A. had no intention to keep faith. Still another is that no sane man can read the Constitution and say that what T.V.A. has done, is now doing and plans to do is permitted by law or conforms to the fundamental concept of our government.

We are glad to support this showdown. We know that it was forced upon the private utilities. We know that the record will show their offers, their more than fair attitude and the necessity that they defend their rights. We have complete faith that the final decision on T.V.A. will be in accord with the Constitution, will support the rights of citizens, will defeat a scheme conceived in politics and operated in a spirit of vindictiveness. There is still justice in America.

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## *Coaxial Communication Cables*

THE essential advantages of the coaxial communication cable consist in the improvement offered against disturbance from outside interference, the reduction of transmission losses due to damping and a consequent broadening of the frequency range available for multiplex service. These advantages have long been rcognized. The increasing need of more frequency channels in carrier telephony and the wide frequency range in view for television methods have emphasized the value of the coaxial cable and led to the development of practicable methods of manufacture.

As regards freedom from interference and crosstalk, the coaxial construction alone is sufficient, since the protection provided by the outside conductor itself becomes better the higher the frequency. The reduction of transmission losses due to attenuation and damping is not so simple, and unless these are reduced to low values the number of repeater stations in long lines becomes unduly high. Ten miles has been mentioned as a possible distance between repeater stations for the cables being developed in this country. Experiment, therefore, has taken the directions of the reduction of transmission losses and the simplification of the

repeater station. An important component of the transmission losses are those in the insulating supports fixing the central conductor with relation to the outer conductor. Thus, effort is made to reduce the material in such supports, utilizing the low loss air to as great an extent as possible. Thin insulating disks at intervals are one of the most obvious simple suggestions, but here there are practical difficulties in assembly, for this type of construction does not lend itself well to the usual types of cabling machines. Alternatives are spirals about the central conductor of insulating material, such as cotton, paper or other fibrous material. These, however, introduce a more than desirable volume of solid dielectric with attendant increase in losses.

A new material and a new method of construction for which advantages are claimed is described in a paper by W. Kieser in the *Zeits. f. tech. Phys.*, No. 12, 1935. The new material, which is called "styrolite," is manufactured by special processes from well-known mineral ores. The finished material, as applied to the insulation of coaxial cables is in the form of spirals, which are themselves in turn spiraled about the central conductor, yielding at all points the proper spacing between inner and outer conductors. It is stated that this method of assembly is directly adaptable to conventional types of cable machines. The dielectric losses in the styroflex are very low and the article referred to gives the results of tests showing conformity to theory and the improvement claimed in measured values. The two-conductor screened cable with styroflex insulation is also described.

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## *Industrial Diesel No Lasting Threat*

QUITE a few people who ought to know better see the Diesel engine writing the doom of purchased power. But from the figures of power installed in the United States R. D. Hayes of Middle West Utilities draws some conclusions. Only about 3.6 per cent of the total power installed in the United States is actually central-station power; 95 per cent is used in transportation and only 1.7 per cent in private industrial power plants. Fuel consumption per kilowatt-hour of output for transportation is estimated at from four to five times that required on the average for central station power. The average gasoline-burning engine installed in automobiles, buses, trucks, etc., also delivers its output at a heat value such that the fuel cost is as great as that of the locomotive.

These facts suggest that the great market for any satisfactory and more efficient type of prime mover must be found in the field of transportation, even with the price of central-station fuel much above its present value. Let us assume that the new and more efficient type of prime mover is the Diesel engine and that it is developed to the point where satisfactory speed control over a wide range is possible. It would probably replace the major portion of steam locomotives and gasoline engines in automobiles, buses, airplanes, etc., and thus fuel oil would replace the present amounts of coal and gasoline now being burned by them also. Only about one-half as many gallons of fuel oil would be required to do the same work as is now done by gasoline in the automobile.

Is it not reasonable, therefore, to expect that, with the increased demand for fuel oil in a market once held by gasoline, fuel oil could and would sell at a price which would render oil-burning stationary power plant equipment incapable of competition with coal-burning plants?

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## *Reserves to Cover Load-Estimate Errors*

CUSTOMARY practice calls for carrying reserve generator capacity at least equal to that of the largest piece of running equipment subject to failure. Probability of losing two units at the same time is quite remote, as S. A. Smith has shown (ELECTRICAL WORLD, February 10, 1934), but there is another factor which is significant in all cases, and especially so where some of the load is railroad electrification. That factor is the error in estimating the day-to-day peaks so as to plan the availability of adequate running capacity.

Unpublished studies by H. W. Phillips, supervisor of the Pennsylvania-New Jersey interconnection, bring this factor into sharp relief, particularly where the largest running machine or reserve is less than 10 per cent of the load. On this system failure of a running machine has occurred at the rate of once in 6.6 years. More significant, however, is the probability of a low estimate of load occurring at the same time that the largest machine goes out of commission. Calculations here show that the chance of a load estimate being low at the same time and by the same amount as the lost capacity is about once in 10,800 years. That in itself would not justify any marginal capacity to guard against the hazard.

But the uncertain nature of the traction load superimposed on the normal departures of the other system load is such that errors of this magnitude are made unavoidably as often as two or three times a year. That is one of the strongest arguments that can be cited for railroads buying their traction power from extensive interconnected systems. The potential hazard of having a machine failure when the estimated load is frequently much less than the actual would tend toward the enforced provision of so much generation capacity as to incur a prohibitively low use factor and a prohibitively high kilowatt investment per revenue ton-mile.

# Minorities in Politics

IT MIGHT prove interesting to the big executives, the public relations counsel and the local officials of the electric industry to study the history of the Mann White Slave Act. It is a demonstration of the workings of minority rule, that curse of democracies, from which this particular industry is suffering more than most, and from which it may continue to suffer for some time to come, assuming that it is going to be permitted to keep on living at all.

Back in 1916—just twenty years ago—this act was brought before the Supreme Court of the United States. Two young men living in California had been convicted of violating it by accompanying two women to Reno.

The high court handed down one of the most amazing decisions in this generation. Stripped of its legal verbiage, the court virtually said to Congress:

"You have the right to do this silly thing if you want to. But it is very foolish. It opens the door to blackmail. More important it is not at all what you intended to do, as clearly shown by your debates at the time the law was passed. You were aiming at commercial vice, not private immorality. Now if you really want to do what you said, instead of what you did, here is the way the law should be written."

THIS writer happened to be covering the Supreme Court on the day of that decision. He was not only an enthusiastic reporter, he was more or less of a crusader. So next day he called James R. Mann, then Republican leader of the House, out of the House chamber.

"Did you read the Supreme Court's decision on your act?" Mr. Mann was asked.

"Yes," said Mr. Mann.

"Do you plan to introduce an amendment to the law along the lines the court indicated?"

Mr. Mann glanced up and down the House lobby. He said nothing. After a moment he deliberately turned and walked back into the House chamber. He was not angry. A few days later he was more than pleasant to the inquiring reporter. But on another subject. He could never again be induced to mention his White Slave Act, favorably or otherwise.

Undiscouraged, this reporter kept on working. Day after day, in lulls between other stories, he interviewed member after member of the House and Senate.

Finally he encountered Senator James Hamilton Lewis, he of pink-whiskered fame.

"My dear fellow," said the Senator, on hearing the question, "you are wasting your time."

"What do you mean, 'wasting my time,'" retorted the reporter. "This will be a good story when I get it. Every paper in the country will play it on the front page."

"Of course they would," said the Senator, "but you will never get it."

"Listen to me," explained the reporter, patiently, "there are 435 members of the House and 96 Senators. Most of them like publicity. Whoever gives me the interview I am after will get plenty."

"But it will be publicity which will hurt them," said the Senator, even more patiently. "So they will not talk. You are obvously ignorant of a fundamental element of politics which is very important, and which I think you should know about.

"Let us suppose, now, that I should give you this interview you want. Tomorrow morning, we will assume, every paper in the country will print it. Now I am interested primarily in Illinois. I am interested in what the people there will think about it. Everybody in Illinois who reads that story, tomorrow morning, we will assume, will be much interested. You say it is a good story. I agree with you. Of all these people, something like 98 per cent will say: 'I agree with Lewis. It is a good move. That law ought to be amended just as the Supreme Court indicated.'

"But the other 2 per cent will say: 'Why, Senator Lewis is a moral leper.'

"Now comes election day, and the people of Illinois go to the polls, voting, among other things, for or against me for re-election. Now we come to the crux of the thing. Of that 98 per cent who approved my action in supporting this change, and who know about it by reading this story I have given you, all of them will vote for me, or against me, for *other* reasons. None of them will vote for me because of it.

"But the 2 per cent, the men and women who, when they read your story, said I was a moral leper, all will vote *against* me regardless of any other reason.

"Now, Illinois is a close state, very often. The switch of less than 2 per cent might be more than enough to defeat me. So I would be virtually committing political suicide to give you the interview you want.

"You mention that there are 435 members of the House and 96 Senators, and that most of them like publicity. I make you this prediction. You are a much younger man than I, but you will not live to see the Mann White Slave Act amended as the court indicated. More than that, you will not live to see any member of the House or Senate propose such an amendment."

Twenty years have passed. Senator Lewis was defeated, stayed out twelve years, and staged a comeback in 1930 when he sensed the turn of the tide on prohibition.

But in all those twenty years his prediction has stood. No Senator or Representative has ever proposed such an amendment, or made a speech advocating a chance!

PERHAPS, some one may say, there should not be such a change. Maybe. But the fact is the Department of Justice, with the tacit approval of every President and every Congress in the last twenty years has pigeonholed that law. No public word has ever been spoken, but U. S. district attorneys know their superiors in Washington do not want that law enforced. Lawyers seeking action against a man on that statute are informed that if any prosecution is made *both parties* will be prosecuted. That has rather effectively taken care of the blackmail angle.

But that 2 per cent—the folks who would think any one trying to amend the law was a moral leper—keep it on the statute books!

It is perfectly true that this illustration of government by minorities is a wild extreme. It is also true that it involves an element not applying to many questions—the

# —By CARTER FIELD

**This noted journalist gives his personal comments and interpretations on current happenings affecting the electrical industry. His background and his location at Washington make his thoughts informative and interesting even though all may not agree with him.**

idea of a moral issue. But that phase is important only because of its compelling force in affecting those who feel it. A determined minority in this country, or any other democracy, can accomplish almost anything if that purpose is paramount with every one of the minority. Even if the minority constitutes only 2 per cent of the population.

WHEN morals or religion enter, it is easy for a few leaders to *make* that issue paramount. Sometimes, lacking this, leaders find it very difficult indeed.

At first blush, for instance, it might appear that selfish interest might make it easy for union labor leaders to control the votes of their members on candidates the leaders think definitely for or against union labor objectives. This has not proved to be the case. As a matter of fact, there is not a single case on record where, beyond any question of reasonable doubt, union labor was able to defeat or elect a candidate for the House or Senate in any state in the union.

Labor leaders, when cross-examined on this, always cite the case of former Senator Pomerene in Ohio in the 1922 election. They claim labor defeated him. In the first place, the majority against Pomerene was not large. In the second, the Anti-Saloon League, then at the height of its power, worked day and night against him. Through its influence, sermons against Pomerene were delivered on the Sunday before election in every evangelical church in the state. So one may be pardoned for thinking that the union leaders simply did not deliver their voters.

Why, it may be asked, did not that very strong minority, the utility stockholders of America, fail to win their fight against the death sentence in the holding company bill last year?

One very simple answer is that they did not start soon enough to make themselves heard. Too many Senators and members of the House had been too definitely committed before they found out there was such a minority in their districts.

But there is another reason, and here is where the present value of the Mann White Slave Act case comes into the picture. A great many Senators and Representatives (always bearing in mind that the utility letter and telegraph writing drive did win on the floor but lost in conference under presidential pressure and under the camouflage of a "compromise") did not believe the writers of those letters and telegrams would carry their grudge until election day.

Shrewd Administration lobbyists pointed out to the legislators that the vast bulk of the letter and telegram writers were interested in securities of the operating companies, and not in the holding companies. And, the same lobbyists asserted earnestly, the President's policy in the long run would benefit the operatng companies, hurt only the holding companies. So that by election the operating company security holders would be grateful to Senators and Representatives who voted with the President.

Just as union labor has always voted just as its individual members pleased, regardless of the judgment and advice of union labor leaders, so, it was contended, utility stockholders will vote as they please—for or against candidates for *other* reasons. Just as the 98 per cent Senator Lewis estimated would approve his action should be attempt to amend the White Slave Act! *Not* as the 2 per cent to whom the issue, in his judgment, would become paromount.

This is still the judgment of a great many members of Congress who personally have a friendly feeling for the electric industry. They are not at all convinced that forcing the holding companies out of the picture in many instances, as is scheduled under the law as finally compromised, will hurt the operating companies. Hence they do not fear that any strong minority back home will be voting against them on this utility law as the paramount issue.

THERE is still another reason. The general impression of the whole country, despite all the distinctions between holding companies and operating companies, was that this law was hostile to the electric industry—that in a way it was part of a general campaign in which the President is enormously interested, the ultimate effect of which would be to cut the profits of the electric industry, to substitute government ownership for private initiative in some localities, to force rates down elsewhere by the yardsticks so established.

This brings another group into the picture—the consumers who would naturally like to pay less for their electricity. And this group, many of the legislators think, certainly in their own districts and states, would more than offset the minority group of utility stockholders.

Logically, this ought not to be true. It is only when any particular thing becomes *paramount* with a minority that it becomes vitally important politically. It has to be sufficiently vital to make them cross party lines, to vote for or against regardless of all other issues. So the present question is, how many utility stockholders regard a politician's attitude toward the business in which their money is invested as the most important political issue?

# NEWS OF THE WEEK

***Utilities Launch New Attack on T.V.A. Act in Federal Court . . . Quoddy Funds Withheld By Senate in Sectional Split . . . Nebraska Power Market Defies Unification . . . Virginia Utilities Near Agreement With Co-op . . . T.V.A. Georgia Power Sales Upheld***

## Utility Groups Start New Case to Test Validity of T.V.A. Act

**Injunction suit strikes at base of Administration power program — Questions validity of virtually every phase of T.V.A.'s operations**

A new phase of the legal battle between the utilities and the T.V.A. was launched on May 29, when nineteen operating utility companies in the Tennessee Valley area brought suit in the District Court of the United States, in Birmingham, Ala., to enjoin the T.V.A. from further operation. They prayed the court to "adjudge and decree that the Tennessee Valley Authority Act of 1933, the power authorized by said act and the power program promulgated by the Tennessee Valley Authority are severally in violation of the Constitution of the United States."

"Execution of the program promulgated by the defendants," the bill continues, "will necessarily and inevitably destroy all or a substantial part of the business and property of the complainants." A similar bill of complaint was simultaneously filed in the state Chancery Court at Knoxville, Tenn.

In contrast with the suit carried to the U. S. Supreme Court by a group of stockholders of the Alabama Power Company, involving the T.V.A.'s right to sell surplus power from Wilson Dam, and which right was upheld by the high court, this suit questions the validity of virtually every phase of the T.V.A.'s operations and, in the opinion of legal experts, strikes at the base of the whole power program of the Roosevelt Administration.

In summarizing charges the bill maintains that the T.V.A. act and operations thereunder are unconstitutional because:

1. They are not authorized by any power delegated to the federal government by the Constitution or any of its amendments.
2. They attempt to expand federal power over matters of intrastate commerce and local police power, in contravention of the Ninth and Tenth Amendments.
3. The act fails to indicate any adequate legislative standard to guide the administrative officers, but, on the contrary, attempts unlawfully to delegate legislative power to the President of the United States and such administrative officers.
4. The act fails to provide for any hearing for persons whose rights will be injured and whose property will be taken by the T.V.A.
5. The act and the operations thereunder seek to fix the rates of the utility companies by means of federally subsidized competition, without a hearing, and without the opportunity for judicial review as to the reasonableness or unreasonableness of the rates, and thereby deny the utility companies due process of law in violation of the Fifth Amendment.

Complainant companies were largely subsidiaries of Commonwealth & Southern Corporation, Electric Bond & Share Company, Cities Service Company and the Associated Gas & Electric Company. They represent virtually all of the principal power generating companies in the Tennessee Valley area.

*Averts multiplicity of suits*

In order to promote "convenient administration of justice" and prevent a "multiplicity of suits," the companies brought a joint action, naming the T.V.A. and its directors, Arthur E. Morgan, Harcourt A. Morgan and David E. Lilienthal, as defendants.

In addition to mentioning the P.W.A., the E.F.H.A. and the R.E.A. as vehicles for fulfillment of various phases of the national power policy, the bill charges that among the intents and purposes of the T.V.A. act is one to launch the federal government upon a competitive commercial enterprise and to draw to the federal government the conduct and management of a business having no relationship to the powers for which the government was established.

The T.V.A. program, the companies charge, "has no direct real or substantial relation to navigation nor any other constitutional function of the federal government."

Charges that the "yardstick" excludes the cost of the major part of the investment necessary to render the service and excludes the necessary operating expenses, which T.V.A. either ignores or recoups from either state or federal taxpayers instead of from the rates, were also made.

The bill of complaint in this action was filed by counsel for the companies, including Newton D. Baker and Raymond T. Jackson of Cleveland, Charles M. Seymour of Knoxville, Tenn., Charles C. Trabue of Nashville, W. B. White and William M. Martin of Birmingham, Ala. They represent the following companies:

Tennessee Electric Power Company, Franklin Power & Light Company, Memphis Power & Light Company, Southern Tennessee Power Company, Birmingham Electric Company, Mississippi Power Company, Appalachian Electric Power Company, Georgia Power Company, Carolina Power & Light Company, Tennessee Public Service Company, Holston River Electric Company, Alabama Power Company, Kentucky & West Virginia Power Company, Inc., Kingsport Utilities, Inc., Kentucky-Tennessee Light & Power Company, West Tennessee Power & Light Company, Mississippi Power & Light Company, East Tennessee Light & Power Company and Tennessee Eastern Electric Company.

David E. Lilienthal, power director of the Tennessee Valley Authority, in a public statement regarding the charges of the nineteen operating utility companies, accused the industry of "ganging up" in attacking the constitutionality of the T.V.A.

"Even this action on the part of the entire electric power monopoly of the United States cannot change the fact that the Supreme Court of the United States has decided that the water power in public streams belongs to the people and that they may use what they own," Mr. Lilienthal said.

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## Government Fails to Unify Nebraska Power Market

Injunction suit of five utilities against three Nebraska power and irrigation projects postponed until the fall will probably never be tried as a new injunction was accepted by both sides this week. The injunction allows the present P.W.A. allotments and completion of the three projects along original plans, but

kills the unification recommended by a special committee last December and any power development on the Tri-County project. Interconnection of the Loup River and Platte Valley projects is allowed.

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## Liner Queen Mary Totally Electrified

Electrical equipment of the *Queen Mary*, 81,000 ton Cunard White-Star liner, which arrived in New York this week on her maiden voyage, is the most extensive ever installed on an ocean liner.

Separate power plants totalling oveh 9,000 kw. provide sufficient power to supply a city of 100,000 population, it is declared. The ship contains 10,000 electrical fixtures and 30,000 electric lamps and will house 2,075 passengers.

All auxiliary machinery, with the exception of the turbo-driven feed pumps for the propelling machinery, is electrically driven. This includes all deck machinery such as steering gear, windlass, capstans and cargo, baggage, mail and boat winches and auxiliary machinery in the main boiler rooms. Power provided by separate plants of four and three 1,300-kw., single-geared, turbo-driven, 220-volt d.c. generators supplied by the British ThomsonHouston Company is distributed by a ring bus system.

Air conditioning is used to a greater extent than ever before aboard ship. Three rooms, the main restaurant, main lounge and the tourist class restaurant, are completely air conditioned. Ventilation, too, received much attention, with fresh sea breezes brought by forced draught from the upper deck to all staterooms, where direction and quantity of air are under control of the passengers.

## Ruling Awaited on P.W. A. Loans

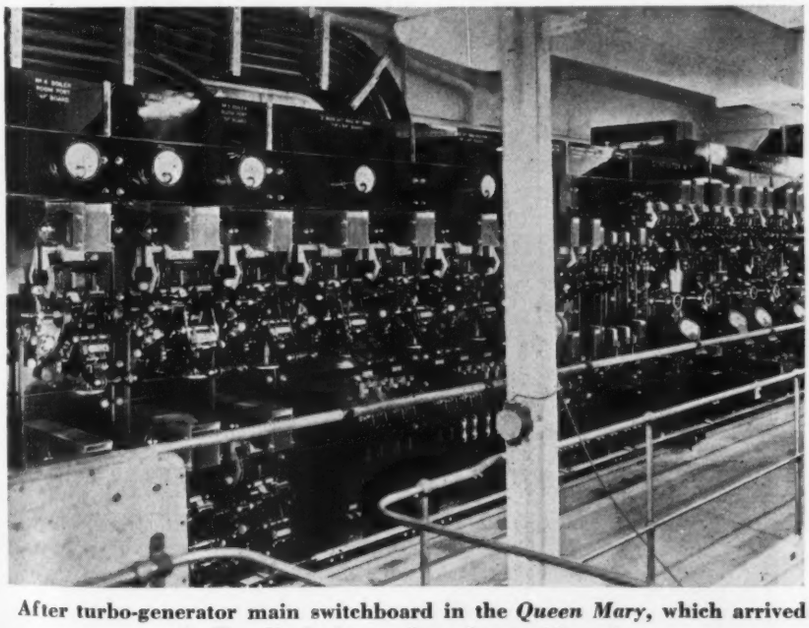
**Utilities rest case against P.W.A. loans — Chief Justice Wheat's decision awaited — Baker assails federal grants.**

Chief Justice Alfred A. Wheat of the District of Columbia Supreme Court took under advisement last week the case in which utility companies in Alabama, Texas, Oklahoma and Iowa brought an injunction suit challenging the constitutionality of the P.W.A.'s power program.

The utilities rested their case after Newton D. Baker, their attorney, had condemned the 1935 emergency relief act as an illegal delegation of Congressional authority, "which gives the President $4,800,000,000 to spend in any way he pleases." "This statute gives the President more power than Hitler or Mussolini," Mr. Baker declared. "Mussolini ordered Parliament to disband because he was tired of it, but our President doesn't need to do that because he already has all the money he can possibly spend."

He asked the court to forbid the allotment of P.W.A. funds for the construction of ten municipal power projects in the states named. Competition of the proposed electric plants, Mr. Baker claimed, would destroy $3,619,000 worth of utility company investments. Maintaining that the projects would merely duplicate existing equipment, he said that "there has not been one syllable of evidence to prove that these developments will have the slightest usefulness, except to lower rates."

Earlier Jerome Frank, P.W.A. counsel, defended the municipal power projects as a legitimate means of breaking up private utility monopolies. "These firms have no right to complain of competition by the government or by any one else," he said. "The courts have no duty to protect a monopoly by any person or any corporation."



**After turbo-generator main switchboard in the *Queen Mary*, which arrived in New York this week on her maiden trip**

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## One Utility Planned for New York

Floyd L. Carlisle, chairman of the Consolidated Edison Company, New York, expressed his gratification at the signing by Governor Lehman of a bill permitting the merger of public utility companies in New York State when not less than 95 per cent of the voting stock is owned.

"This measure will permit the merger of all gas and electric companies affiliated with the Consolidated Edison Company of New York with real advantages both to consumers and stockholders," Mr. Carlisle said. "As soon as possible it is our purpose to apply to the Public Service Commission for permission to begin the merger process which will ultimately make one company out of the present operating utilities in the group. . . . There will be a great reduction in bookkeeping and other economies of administration which will contribute toward reductions in rates. I look to this as a genuine step forward in supplying gas and electric service in the metropolitan area."

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### Relief Bill Passed by Senate, 62 to 14

On Monday, June 1, the Senate passed, by a vote of 62 to 14, the Deficiency Appropriation Bill, containing $1,425,000,000 for work relief and $300,000,000 for grants and loans on public works to be expended during the coming fiscal year. Much of the debate of the day was taken up with the P.W.A. amendment which the Senate appropriations committee added to the House bill. It would hve limited grants made from the $300,000,000 fund to 30 per cent of the cost of the project. Present P.W.A. practice is to grant up to 45 per cent. By a voice vote the Senate struck out the limitation.

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### Two Utility Bills Killed

The Massachusetts House killed last week two bills designed to regulate public utility holding companies. One bill would have required that all holding companies' stock be approved by the Department of Public Utilities, while the other bill subjected voluntary associations and trusts to corporation laws.

# Agreement Near With Virginia Co-op.

**Utilities and co-operative agree to work together in electrifying Virginia farming areas — Seek understanding on allocation of territory**

Private power companies and the newly formed co-operative rural electrification groups in Virginia seem to be on the verge of agreement in the question of the electrification of Virginia farming areas. Meeting in conference called at the suggestion of the state Corporation Commission, L. F. Riegel, representing the Virginia Electric & Power Company, and D. W. Burruss, president of the Shenandoah Valley Electric Co-Operative, agreed to work together to bring electricity to Virginia farms.

Burruss asked specific commitments from the utility representative as to whether wholesale rates would be granted the co-operative distributing groups and if they would agree to electrify a whole area rather than skim off the cream of the business.

"We will co-operate," Riegel said, but added that it was the opinion of his group that existing companies should have the "first chance."

Burruss, head of the co-op, which will shortly ask for a loan of $125,000 from R.E.A., was particularly interested in the wholesale cost of power in the Augusta-Rockenbridge, Shenandoah area. Burruss said also that the co-operative wants an understanding regarding an allocation of territory.

Both co-operative and private utility representatives agreed that the state Highway Commission should relax its regulations to permit erection of poles on primary highway rights-of-way. They will seek a conference with Highway Commissioner Henry G. Shirley on the matter. Named to a committee which will wait on Commissioner Shirley were: Riegel and O. G. Martino, East Coast Utilities representing the private companies, and Dr. Meade Ferguson, master of the State Grange, and C. Nelson Beck, chairman of the agricultural board, representing the farming interests.

Among the firms represented at the meeting were the Virginia Electric & Power Company, Northern Power Company, East Coast Utilities Company, Virginia Public Service Company. Agricultural organizations included the Virginia Polytechnic Institute, the Virginia Grange, the Farm Bureau Federation and the Agricultural Conference Board.

Other rural electrification news items include the following:

ILLINOIS — A total of $295,000 has been allotted to five adjoining co-operative projects in central Illinois and eastern Missouri by the R.E.A. These projects will co-ordinate their operations, purchasing wholesale power from municipal plants of Hannibal Mo., on the west, and Springfield, on the east. They are: Morgan County Electric Co-operative, Jacksonville, $50,000 for 138 miles of line; Pike County Electric Co-operative, Pittsfield, $85,000 to begin work on 362 miles in Pike, Scott and Adams counties. Scott County Electric Co-operative, Winchester $50,000 to start 85 miles. Menard County Electric Co-operative, Petersburg, $35,000. Marion County Electric Co-operative, Palmyra, Mo., $75,000 for first section of 320 miles in Marion, Lewis, Shelby, Monroe and Ralls counties, Missouri.

SOUTH CAROLINA—First of the rural electrification lines to be completed in Fairfield County is the line from Salem Cross Roads to Monticello. Power in many of the houses and several of the stores was turned on this week.

WISCONSIN—Some 800 customers of the Richland Co-operative Electrical Association, Richland, which has received final approval on a $250,000 loan from the R.E.A., will purchase 381 radios, 372 washing machines, 203 water pumps, 152 utility motors, 83 vacuum cleaners, 78 refrigerators, 49 milking machines, 34 water heaters, and 35 stoves as soon as they get power, according to a survey made.

SOUTH CAROLINA—Construction work on rural electrification lines in South Carolina will begin not later than June 1, according to C. R. Talley, field superintendent of the W. E. Callahan Construction Company of Dallas, Texas. This company was awarded the contracts for construction of seventeen sub-projects by the state rural electrification authority. The seventeen projects, involving 147 miles of line, will be completed within 90 days, according to Talley.

ARKANSAS—The city of Osceola has applied to the state Department of Public Utilities for a certificate of convenience and necessity to extend its rural lines to serve approximately 25 farmers near Osceola.

WISCONSIN—Approximately 100 rural customers have been added to the lines of the Wisconsin Power & Light Company in the Mineral Point district this year and other new lines and extensions have been approved or are under construction, which will serve 83 additional customers. New lines built to date total 28½ miles and the additional planned extensions will total about 27 miles. All proposed extensions will be connected with a line built seventeen years ago south of Belmon and sold to the power company last summer for $1. The utility has spent $6,000 to rehabilitate this line.

•

# Illinois Tax Ruled Unconstitutional

The 3 per cent occupational sales tax on electricity, water and gas sold by municipally owned public utilities in Illinois was declared unconstitutional in a decision rendered last week by Circuit Judge Walter La Buy. The ruling affected the City of Chicago and 176 other municipalities in the state which joined in two suits challenging the legality of the tax law, enacted by the General Assembly in June, 1935.

Judge La Buy held the law violates provisions of the Constitution requiring uniformity and equality in taxation and prohibiting the Legislature from passing local or special laws.

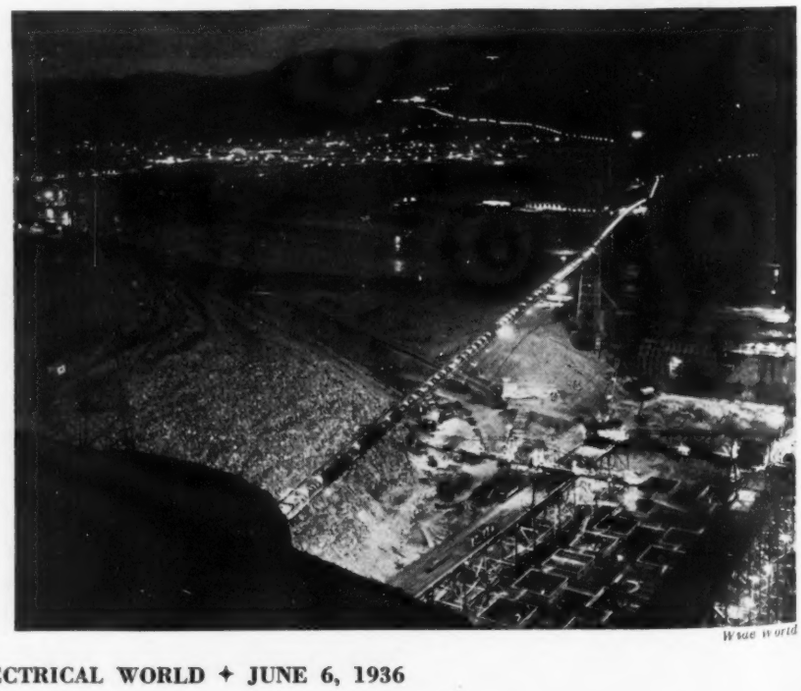
Attorneys for the plaintiffs expressed the opinion that the ruling was broad enough to affect privately owned utilities as well as those owned by municipalities.

•

## Lehman Signs Utility Bill

The bill of Senator Dunnigan of New York authorizing the merger of domestic gas and electric corporations where there is 95 per cent stock ownership was signed last week by Governor Lehman. Under the present law 100 per cent stock ownership is required. The bill was recommended by the joint legislative committee, headed by former Judge John E. Mack of Poughkeepsie, which investigated public utilities. Before such

## NIGHT WORK AT GRAND COULEE



Wide world

merger can be effectuated it will be necessary to obtain the approval of the Public Service Commission.

Governor Lehman also approved the Killgrew bill, providing for the filing with the commission all written contracts and arrangements for purchase of electricity or gas, charge therefor not to exceed a reasonable charge, burden of proof as to such cost to be on utility company purchasing the electricity or gas and commission having right to disapprove contract arrangement.

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## Arkwright Spikes Mayoralty Report

Reports that Preston S. Arkwright, president of the Georgia Power Company, was being groomed without his knowledge or consent for the office of Mayor of Atlanta brought this response from Mr. Arkwright:

"The suggestion of me for Mayor of Atlanta is, of course, very flattering, but I can't imagine any one taking it seriously.

"The mayoralty of Atlanta is a position of great importance and distinction, and it would be an honor to any one to serve in that capacity or even to be considered as capable of filling the office acceptably.

"I am fortunate in having friends in various walks of life in Atlanta. They are inclined to think better of me than I deserve, which, of course, I like. However, I feel certain that many people in Atlanta will consider that my special business connection disqualifies me for Mayor, and I am rather inclined to think, myself, they may be right.

"In any event, while I am most appreciative of the suggestion, it would be out of the question for me to run for the office or even to accept it if by some sort of miracle I should happen to be elected."

•

## New York Tax Upheld

By a unanimous decision the Appellate Division upheld last week the right of the city of New York to tax public utilities and rejected a test motion by Standard Gas Light Company, a subsidiary of the Consolidated Edison Company, which would, in effect, have forced the city to refund $30,000,000 in utility taxes collected and used for emergency relief purposes. The decision upheld Justice Joseph M. Callahan, who decided last December that the enabling acts passed by the Legislature in 1933 and 1934 to aid the city to collect relief funds to balance its budget specifically provided that the taxes imposed under the enabling act should "be in addition to any and all other taxes."

# Senate Withholds 'Quoddy Fund, but Approves Florida Canal

**Southern members defeat tidal project after Maine senators oppose canal — Vandenberg leads opposition to both projects in sharp sectional split.**

Showing a unique and rather unusual display of technical-economic intelligence and independence, the Senate rejected a proposal for a survey looking to continuance of the Passamaquoddy power generation project on May 30 by a vote of 39 to 28. The Florida canal won out, but the "shoddy" tidal project lost.

The question arose when Senator Robinson, Democratic leader, sought, at the behest of President Roosevelt, to change an amendment to the deficiency bill relating to the work relief fund of $1,425,000,000 to provide that two boards of three "impartial" engineers each be appointed by the President to review this and the Florida Canal project. Under this amendment the President could have allotted $9,000,000 to 'Quoddy and $10,000,000 to the ship canal if the boards found continuance justified.

*Sought to change amendment*

The committee amendment that Senator Robinson sought to change set forth that no work relief funds could be allotted to any project that could not be completed with funds on hand. 'Quoddy would cost $42,000,000 and the ship canal $150,000,000, according to present estimates, and it is evident that the President would not take such large sums out of the relief appropriation to use on only two projects.

Both projects were started with funds from the $4,800,000,000 work relief appropriation voted at the last session of Congress. Senator Vandenberg, who led the opposition to both projects, held that Congressional authorization was never granted for either project. He has succeeded in keeping out of previous appropriation bills any money to carry them on.

Senators Hale and White of Maine have consistently opposed the Florida Ship Canal with other Republicans, but have urged further work on the tidal project. To enable them to keep their positions Senator Hale forced a division of the question on the Robinson amendment, so that two ballots were taken, one on each project. It is generally conceded that this action on the part of the Senator from Maine was primarily responsible for the 'Quoddy defeat. It is believed that if both projects had been blanketed together the amendment would have carried.

As it was, the vote on the Florida Canal came first and though the vote was close (35 to 30) a flurry of "ayes" from Administration "rubber stamps" carried the day for Florida and the ship canal bogey.

Each of the Maine Senators had voted No. When the time came for a rollcall on the 'Quoddy project it was evident that the Southern Senators resented this action and were out to "get" the "men from Maine," which they did with the recorded vote of 39 to 28.

Senator Vandenberg in leading the attack on the Florida and Maine projects claimed that President Roosevelt was attempting to make Congress share the responsibility for starting them. "He started all these projects," the Michigan Senator shouted, "but when he gets into hot water he wants us to share the bath." Pointing out that "we are back boondoggling in 'Quoddy Bay and pipe dreaming on the phantom Florida Canal," he said that 'Quoddy had been turned down by the P.W.A., and the Federal Power Commission and that the Commerce Department had indicated disapproval of the canal.

"There never was any justification for these projects and there isn't any now," he declared, and we are forced to admit that we have no reason to doubt the truth of this part of the Michigan Senator's statement.

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## Wisconsin to Discuss Exchange of Power

The Wisconsin Public Service Commission has called a conference of utility officials in Madison June 9 to discuss a plan for general exchange of power by the major electric companies in the state to prevent development of excess generating facilities. One of the reasons for the commission's decision was the recent announcement of expansion plans by the Wisconsin Public Service Corporation.

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## Portland Modernizes Transit System

Climaxing a plan four years in the making, Portland, Ore., has taken the first step in a complete modernization program for its transportation system by obtaining 120 new trackless trolleys. Sixty of the new trolleys are to have General Electric single-motor drive and braking equipment. The acquisition of the new trolleys marks the beginning

of a truly co-ordinated transportation service for Portland. In conjunction with the trackless trolleys, the Portland Traction Company plans to operate modern street cars and gasoline motor buses.

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# Joint Distribution for Imperial Valley

**Dolson of Southern Sierras Power makes offer for joint operation at commission hearing — Plan would effect huge economies — Bailey also testifies.**

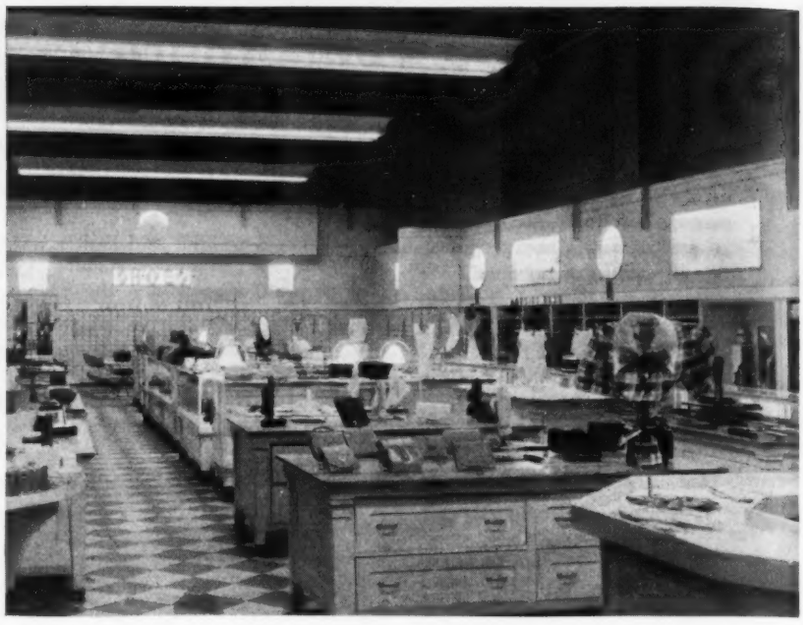
An offer on the part of the Southern Sierras Power Company to enter into negotiations with the Imperial Irrigation District for joint operations in the distribution of power in the Imperial Valley was made at a recent rural electrification hearing before the California Railroad Commission.

In his proposal F. O. Dolson, vice-president and general manager of the company, suggested that the power company would continue to distribute power under a program similar to the "Washington Plan." He proposed that the power company would help build hydro plant number three on the All-American canal, that the program would obviate the necessity of an expenditure of approximately $8,000,000 for a distribution system by the district; would save between $700,000 and $800,000 annually in interest and operating costs in serving the valley; would make profits possible for the district out of which to meet the first obligations to the federal government in canal payments; would bring about immediate reductions in rates throughout the entire valley to the figure suggested by the district, and would mean immediate complete rural electrification.

It was suggested that rates and other matters could be adjudged by agreement between the power company, the district and the state Railroad Commission. By this manner also would be determined the rate of return to the company, the proper price for the delivery of power and other items vitally affecting the irrigation district, the stockholders of the power company and the consumers.

At the hearing Paul Bailey, consulting engineer for Southern Sierras, stated that he felt there was no need for the construction of new generating facilities in southern California for the next decade unless there might be an opportunity for the exportation of power. His study of the situation showed him, he said, that the existing power distribution services now in southern California would be sufficient to handle power needs for that period of time.

## LIGHTING FOR DECORATION



**Distinctive beauty can be obtained with modern lighting, as evidenced by this attractive interior of a Salt Lake City women's shop**

# T.V.A. Power Sale Upheld in Georgia

Federal Judge Samuel H. Sibley of the Federal Circuit Court of Appeals, in a decision handed down May 28, upheld the right of the T.V.A. to sell and distribute electric power in Georgia. Judge Sibley denied an injunction sought by the Georgia Power Company to prevent the federal agency from selling and distributing power in the state. Attorneys for the power company announced their intention of carrying their contention that the T.V.A. is "illegal, unfair competition" to the highest court.

Referring to a part of the power company's injunction plea which cited that the authority was operating in Georgia without the consent of the state, Judge Sibley pointed out that Georgia cannot object to the federal government disposing of public property and that, furthermore, the state had made no objection. He ruled that government property may be sold to prevent waste. The judge said that since electric power is generated by use of natural resources publicly owned, this electricity may be disposed of under that principle.

Judge Sibley expressed doubt, however, as to the right of the T.V.A. to make rules and regulations for power sold for resale and to fix rates for such resale. Invalidation of that part of the act would not nullify the entire act, however, he declared.

He indicated, however, that for the government to enter into competition with private business for an indefinite period and without restriction would involve matters for consideration of Congress and the courts.

"The United States has purchased vast forest reserves in order to control flood and promote navigation, and inevitably trees have grown in them," the judge wrote. "These need not be left to die and rot, but may be sold, and no doubt a railroad may be built to carry them to market, but one would doubt that Congress could establish planing mills and chair factories in our cities under the guise of selling lumber.

"This illustration suggests there must be limits to the ways in which electricity may be disposed of. The limits of decency are for Congress to consider," the judge declared.

Litigation originated with a petition for injunction filed by the power company to prevent the T.V.A. from constructing a power line across the right-of-way of the company in Catoosa County. Judge Hugh M. Dorsey of the Fulton Superior Court issued a temporary injunction. The case was then transferred to the federal court by the T.V.A.

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## Boulder Dam Power Delayed

Power from Boulder Dam will not be available to Los Angeles and other distribution centers until the fall of 1936 because of delays in the installation of generating equipment, according to an announcement by the Bureau of Reclamation. Part of the equipment to be used at the dam was damaged during the recent flood at Pittsburgh, it was stated. It had been planned to start power delivery in July.

# Tupelo's Mayor Replies To Willkie

Charging that if Wendell L. Willkie, president of the Commonwealth & Southern Corporation, "will get his retail rates down to something like" those of Tupelo, Miss., "he should still be able to make a profit and give considerable help to the taxpayers, in whom he seems to be intensely interested," Mayor J. P. Nanney of Tupelo responded to Willkie's statement last week to stockholders of the Commonwealth. Willkie said that "the low electric rates charged in the limited area in which T.V.A. is operating are made possible only by additional taxes paid by the people in all parts of the country."

Nanney attacked Willkie's statement that his operating companies in the T.V.A. area could lower their rates at least 25 per cent below the T.V.A. rates if they were given the same gifts from the federal treasury. Mayor Nanney pointed out that West Point, Miss., paid $915.07 for 131,200 kw.-hr. in Mississippi this year, while the T.V.A. rate would have been $914.07.

"It seems that the T.V.A. is not selling wholesale its electricity at the expense of the taxpayers of the United States, but is getting as much for it as the utilities charge. The only difference seems to be that the T.V.A. requires its municipal and association customers to resell the electricity to the people at a reasonable rate. The city of Tupelo is buying its electricity wholesale from the T.V.A. at the regular T.V.A. wholesale rate, without any subsidy in the form of management, money, material, bookkeeping, billing or any other form, and is reselling it to customers at a lower rate than that enjoyed by any other city in the South and we are still making money," he said.

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# F. B. Lewis Heads Pacific Coast Group

At the annual meeting in San Francisco on May 28 the Pacific Coast Electrical Association elected as its president Fred B. Lewis, vice-president and general manager of the Southern California Edison Company, Ltd.

"The year 1936 marks the beginning of another great forward surge by the electrical industry," Mr. Lewis said in a brief address of acceptance. "Production records of electricity on the Pacific Coast for 1936 will exceed all former marks. The outlook for sales surpasses all estimates of a year ago. California will this year afford a market for 150,000 electric refrigerators, 90,000 washers, 20,000 ironers, 180,000 radios, 20,000 ranges and 10,000 water heaters. The industrial load is growing rapidly due to the renewal of activity in our factories and the arrival of many eastern manufacturers who are establishing plants in California to supply Western markets. Electric rates continue their downward trend. The elaborate survey conducted by the Federal Power Commission shows that rates on the coast are the lowest in the country . . ."

"With the return of public utility properties to local tax rolls the public has had an opportunity to learn more of the facts concerning the part played by our industry in the support of government. As a result of the Riley-Stewart plan $900,000,000 in assessed valuation is now being taxed for city, county and school district purposes. With few exceptions the local utility is the largest taxpayer in any community."

Other officers elected are W. R. Marshall, Westinghouse Electric & Manufacturing Company, vice-president; D. E. Harris, General Electric Supply Corporation, vice-president; N. R. Sutherland, Pacific Gas & Electric Company, was re-elected treasurer.

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## Utility Sale Approved

Approval of the sale of the Erie Lighting Company to the Pennsylvania Electric Company was announced recently by the Federal Power Commission. Both companies are subsidiaries of Associated.

## COMING MEETINGS

**International Union of Producers and Distributors of Electric Energy**—Sixth congress, Scheveningen, Holland, June 10-20.

**American Institute of Electrical Engineers**—Summer convention, Huntington Hotel, Pasadena, Calif., June 22-26. H. H. Henline, national secretary, 33 West 39th Street, New York.

**Society for the Promotion of Engineering Education** — Annual meeting, University of Wisconsin, Madison, June 23-26. Dr. F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

**Canadian Electrical Association** — Annual convention, Murray Bay, Quebec, June 24-26. B. C. Fairchild, secretary, Power Building, Montreal, Que.

**American Society for Testing Materials**—Annual meeting, Chalfonte-Haddon Hall, Atlantic City, June 29-July 3. R. E. Hess, assistant secretary, 260 South Broad St., Philadelphia, Pa.

**Illuminating Engineering Society**—Annual convention, Statler Hotel, Buffalo, N. Y., August 31-September 3. A. D. Cameron, general secretary, 29 West 39th Street, New York.

**Third World Power Conference**—Washington, D. C., September 7-12. Joel Wolfsohn, executive secretary, Interior Building, Washington, D. C.

**International Association of Electrical Inspectors**—Eastern section, Hotel New Yorker, New York, September 8-10, Northwestern section, Olympian Hotel, Olympia, Wash., September 14-16.

**Association of Iron and Steel Electrical Engineers** — Annual convention, Detroit, Mich., September 22-25. Brent Wiley, managing director, Empire Building, Pittsburgh, Pa.

# West Penn Expands Springdale Plant

To supply anticipated demands for electric service in the territory it serves in western Pennsylvania, West Penn Power Company, through its president, H. L. Mitchell, announced recently that contracts have been placed for the purchase and installation of equipment which will add 50,000 kw. in generating capacity at the Springdale power station. "This expansion is being made to give adequate assurance of ample power to meet present needs and anticipated future development of the western Pennsylvania industrial area," said Mr. Mitchell. An expenditure of $5,500,000 is contemplated in these additions and improvements.

The new installation at Springdale will consist of a superimposed 50,000-kw. Westinghouse turbo-generator, operating at a speed of 3,600 r.p.m., using steam at 1,250 lb. pressure, with a temperature in excess of 925 deg. F. Three Babcock & Wilcox boilers are to be installed to supply steam for the operation of the new 50,000-kw. unit.

The electric energy from this new installation will be generated at 11,500 volts and stepped up by transformers to 25,000 volts for local distribution and 132,000 volts for transmission to other parts of the system. Improvements to the transmission system are also planned for the 25-kv. and 132-kv. lines and substation facilities. Additional coal-storage and coal-handling facilities are to be provided. The new installation will also include auxiliary equipment, such as switchboard, motors, fans and pumps.

Work will commence on this project at once under the supervision of Sanderson & Porter of New York.

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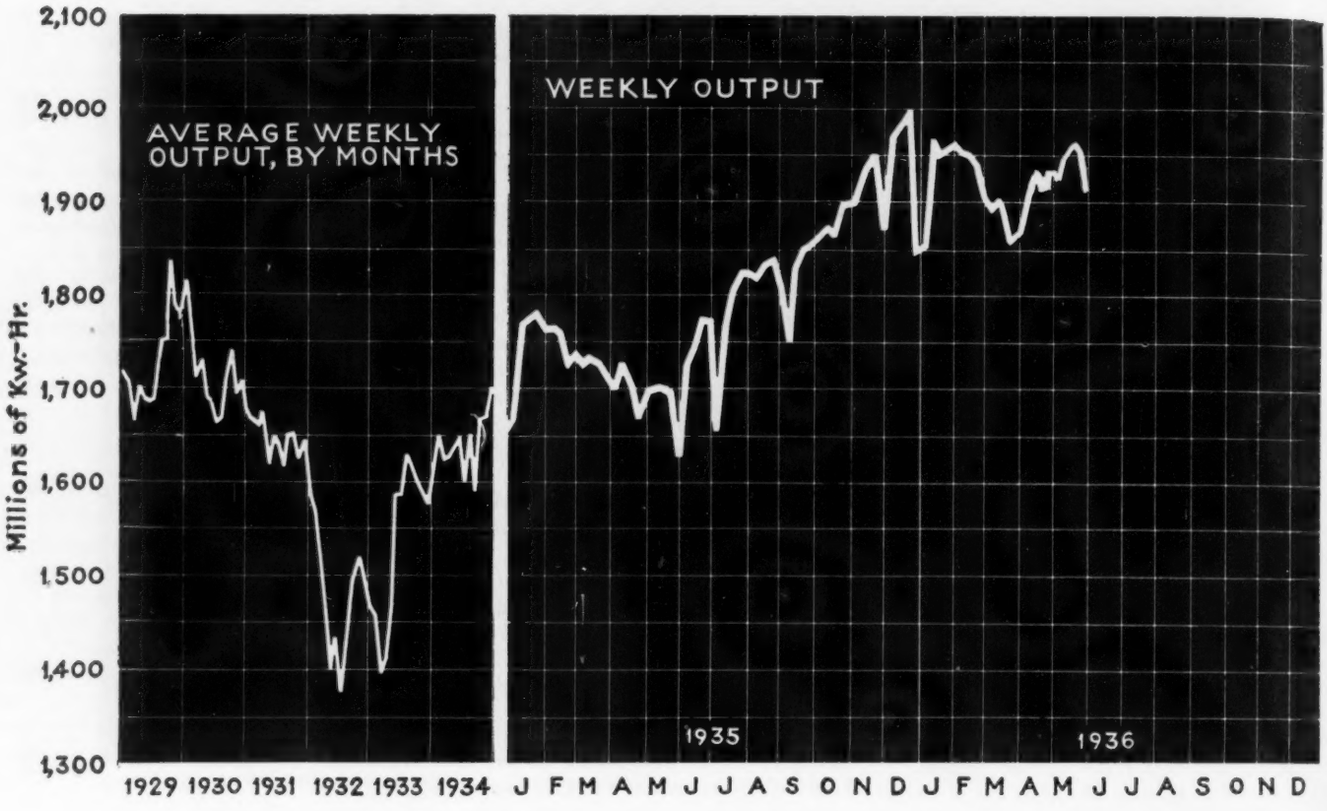
## Quebec Power Board Extends Control

Quebec Electricity Commission has issued a general order decreeing that when a public utility company wishes to issue, retire or refund any stocks or bonds, or to make any change whatsoever in its capitalization which involves the issuance of securities or retirement for other than sinking fund purposes, application must first be made to the commission at least two weeks before any public offering is made.

The order further provides that a financial statement of not more than 90 days prior to the date of application must accompany the application for new issues, while particulars of the underwriting syndicate must be stated at the same time.

# Output Makes Largest Gain on Record




Ever-widening gains over last year's operations continue to be revealed by the figures on output of electric light and power plants announced by the Edison Electric Institute. With the production of 1,922,108,000 kw.-hr. in the week ended May 30 the excess over the corresponding period of 1935 rose to 18 per cent, the largest ever reported in this series of weekly figures going back to 1928. Even the extraordinary uprush in 1933 brought no such growth, the maximum in that year being 16.4 per cent.

The week that includes Memorial Day invariably shows a recession from the preceding one, normally around 60,000,000 or 70,000,000 kw.-hr. but only half as large this year. It should be noted that the holiday fell on a Saturday and therefore had less than the usual effect on industrial operations.

Gains over 1935 surpassed the national average in all regions but two, the Middle Atlantic and the Pacific, the latter dropping to 11.9 per cent.

**Per Cent Change from Previous Year**

| | Week ended | | |
|---|---|---|---|
| | May 30 | May 23 | May 16 |
| New England..... | +18.7 | +12.8 | +11.6 |
| Middle Atlantic... | +13.4 | +12.1 | +13.4 |
| Central Industrial. | +21.7 | +17.3 | +16.9 |
| West Central..... | +18.3 | +14.9 | +16.6 |
| Southern States... | +20.4 | +16.9 | +15.3 |
| Rocky Mountain.. | +22.8 | +23.3 | +20.0 |
| Pacific Coast..... | +11.9 | +13.2 | +16.2 |
| United States... | +18.0 | +15.3 | +15.4 |

**Weekly Output, Millions of Kw.Hr.**

| 1936 | 1935 | 1934 |
|---|---|---|
| May 30...1,922 | June 1...1,629 | June 2...1,576 |
| May 23...1,955 | May 25...1,696 | May 26...1,655 |
| May 16...1,962 | May 18...1,700 | May 19...1,650 |
| May 9...1,948 | May 11...1,702 | May 12...1,643 |
| May 2...1,929 | May 4...1,698 | May 5...1,633 |
| Apr. 25...1,933 | Apr. 27...1,673 | Apr. 28...1,669 |
| Apr. 18...1,915 | Apr. 20...1,702 | Apr. 21...1,673 |

## April Output Up 13 per Cent

Energy production in public utility plants in April exceeded last year's for the same month by 13 per cent, rising to 8,869,655,000 kw.-hr., according to the U. S. Geological Survey. This compares with a gain of 11 per cent in March and a revised total for that month of 8,904,891,000 kw.-hr. The average daily production was 295,700,000 kw.-hr., or 3 per cent larger than in the preceding month, thus running counter to the normal change which is a decrease of 1 per cent from March to April.

The gain over a year ago has been around 13 per cent since last September and that rate is being maintained, after a moderate sag in March. Water power contributed 3,989,737,000 kw.-hr., or 45 per cent of the total. Regional changes are shown in the table.

The quantities reported by the Geological Survey are not restricted to central stations for light and power, but are based on the operations of all power plants producing 10,000 kw.-hr. or more per month, generating energy for public use. This includes electric traction, public works and others.

**Gains Over Previous Year, per Cent**

| | Dec. | Jan. | Feb. | Mar. | April |
|---|---|---|---|---|---|
| United States. | +13 | +11 | +15 | +11 | +13 |
| New England... | + 9 | + 3 | + 9 | — 1 | + 2 |
| Middle Atlantic.. | +11 | + 8 | +15 | +10 | +13 |
| E. No. Central.. | +18 | +13 | +14 | +12 | +15 |
| W. No. Central... | + 4 | — 2 | + 6 | + 5 | + 1 |
| South Atlantic.. | +16 | +20 | +23 | +18 | +23 |
| E. So. Central... | +16 | + 9 | + 9 | + 9 | +10 |
| W. So. Central.. | +14 | +10 | +16 | +12 | +12 |
| Mountain ..... | +14 | +19 | +17 | +20 | +[illegible] |
| Pacific ..... | +14 | +14 | +18 | +13 | +15 |

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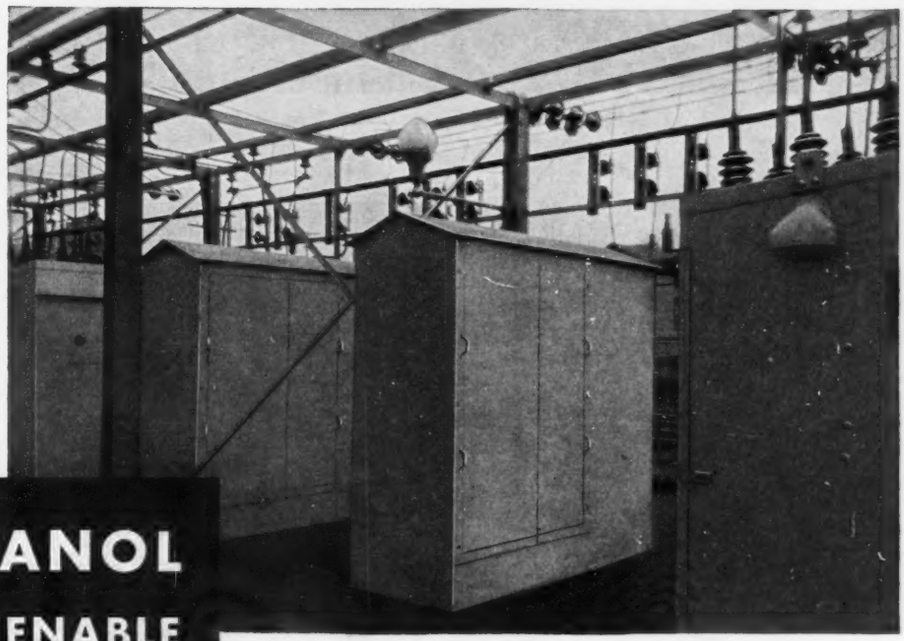
## Uniform Rates Advocated for State of Washington

Uniform electric rates in the state of Washington would result in a three- or four-fold increase in energy consumption, in the opinion of Carl E. Magnusson, University of Washington dean and chairman of the State Planning Council's committee on power markets. Industrial expansion, paper and pulp manufactures, irrigation, manufacture of nitrogen and munitions, mining and highway and railway electrification were listed by Dean Magnusson as factors.

# GAIN CAPACITY *with* CAPACITORS

**SOLVE THE PROBLEM OF LACK OF SYSTEM CAPACITY WITH A NEW APPLICATION OF A WELL-TRIED TOOL.**



## G-E PYRANOL CAPACITORS ENABLE YOU TO GAIN KW CAPACITY ANYWHERE ON YOUR SYSTEM, QUICKLY AND INEXPENSIVELY

WITH central-station loads mounting to new peaks, G-E Pyranol capacitors are assuming a new importance because they return the following benefits with minimum investment:

**They Increase Capacity** of feeders, regulators, transformers, and cable

**They Reduce Losses**

**They Improve Voltage**

Many power companies have already applied G-E Pyranol capacitors to prevent overloading of their circuits, with complete success.

The advantages possessed by this equipment:

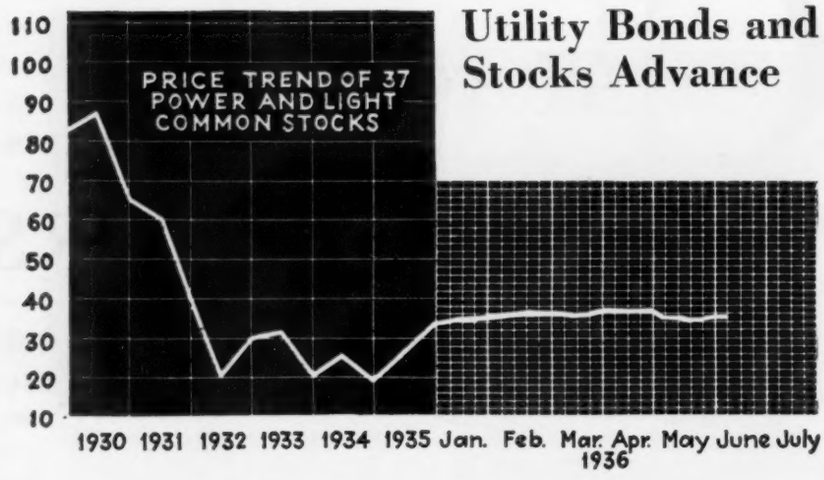
1. Low operating cost, due to low losses and low maintenance expense, together with maximum safety because of Pyranol.
2. Low installation cost.
3. Special provisions for ventilation are unnecessary.
4. Special foundations are not required.
5. Flexibility, due to use of individual units of relatively small kva rating.
6. Can be obtained quickly—because of short time required for shipment and installation.
7. 99.87 per cent of the Pyranol capacitors — manufactured in the last five years—have a perfect operating record.

It will pay to investigate this method of adding kw capacity to your system. Ask for reprint GEA-2367, "Capacitors Prove Out in Decade of Service," an article from *Electrical World*. General Electric, Schenectady, N. Y.

360-115

**GENERAL ELECTRIC**

# Utility Bonds and Stocks Advance



**High-grade light and power bonds held firm during May. "Electrical World" index, 105.6; April, 105.4. Stocks advanced during the past week to 35.6 from 35.0 in the last week of May.**

# Public Service Bids for Jersey Utility

Public Service Corporation of New Jersey has addressed a letter to the protective committee for holders of National Public Service Corporation 5 per cent debentures expressing a willingness to submit a bid of $5,000,000 for 68 per cent of the common stock of the Jersey Central Power & Light Company, the only important collateral securing the debentures, in the event that the committee decides to offer it at auction.

Associated Gas & Electric System previously acquired from the Central Hanover Bank and Trust Company 32 per cent of the Jersey Central shares which the bank had reduced to possession following default on their bank loans by the Insull utility companies.

The committee has on deposit $14,500,000 of the $20,000,000 debentures, or 72.5 per cent of the total. Some weeks ago it extended to September 1 the final time for the deposit of debentures. One of the conditions of the Public Service Corporation's offer was that the collateral be put up for sale before October 1.

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## Tennessee Utility Denies Right to Revoke Franchise

Tennessee Electric Power Company filed an answer in Chancery Court at Chattanooga May 26 denying that the city of Chattanooga had the right to revoke its franchises. An attack on the power company's franchise to sell electricity was filed last November after Chattanooga had voted for a municipal power plant with T.V.A. electricity. The power company's answer makes the contention that its franchise was an act of the Legislature and that the city had no authority to revoke it.

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# Syndicate Acquires Control of Utility

The $11,946,735 notes of the United States Electric Power Corporation held by the Chase National Bank, the Guaranty Trust Company and the Chemical Bank & Trust Company, secured mainly by a controlling interest in the $1,200,000,000 Standard Power & Light Corporation, have been bought at private sale by a group partly representative of ownership of United States Electric Power. Members of the syndicate, which purchased the notes severally from the three banks, were the J. Henry Schroder Banking Corporation, the Bancamerica-Blair Corporation, W. C. Langley & Company, A. C. Allyn & Company, Inc., Emanual & Company, and others. Bancamerica-Blair had not previously been identified with United States Electric Power.

It was said by the purchasing group that the acquisition had been made with a view to permitting holders of United States Electric Power shares to purchase the Standard Power & Light stock at cost, less expenses, under a plan which has not been worked out. Standard Gas & Electric Company, a Standard Power & Light subsidiary, is under proceedings of reorganization under section 77b of the National Bankruptcy Act. United States Electric Power Corporation has 70 per cent of the Standard Power & Light equity.

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## Connecticut Power Merger Is Approved

Merger of the Connecticut Power Company and the Stamford Gas & Electric Company was approved last week by the Public Utilities Commission.

The approval, overriding objections of minority stockholders of the Stamford concern and of Mayor Phillips of that city, specified that the consolidation must have the indorsement of the stockholders of each company, on or before December 31, this year, and permits recourse to the courts and arbitration for aggrieved parties.

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## Utility Increases Dividends

Directors of the American Power & Light Company have declared a dividend of 75 cents a share on the $6 preferred and 62½ cents on the $5 preferred stock. In previous quarters dividends of 37½ cents on the $6 preferred and 31¼ cents on the $5 preferred were declared.

# HOW TO CUT MAINTENANCE ON STREET-LIGHTING EQUIPMENT

## *Check these features*

**1.** Glassware that will withstand most blows from rocks, or shots from BB guns—pressed glass, a quarter inch or more thick.

**2.** Practically no cleaning of the inside of the globe or reflector—the glassware sealed onto the reflector with a permanent, dustproof, weatherproof, and insectproof seal.

**3.** Minimum cleaning of the outside of the globe—all glass surface is on the under side, where dust will not settle; rippled glassware which will not streak from rain, which allows dirt to be washed off, and which is easy to clean.

**4.** No new glassware needed because of chipping of the edge; no handling of the glassware alone—the glassware is never removed from the reflector; it is sealed on in the factory, and should it ever be broken, the luminaire is replaced with a complete, reconditioned unit.

**5.** Installation is easier than with other luminaires, because of the very light weight.

**6.** Price, with the Holophane rippled refractor, as low as $35.10 list, from which is deducted a liberal discount.

GENERAL ELECTRIC'S new Form 79R is a street-lighting luminaire that combines the already popular deep Alzak aluminum reflector with a specially designed Holophane rippled refractor of a single thickness of glass. This combination will help you cut maintenance. In addition to the listed advantages are those of light distribution. About 90 per cent more light on the street than the best comparable luminaire of older design; sharp cut-off at 80 degrees, eliminating objectionable glare; adequate, effective shielding of the "house side," with this otherwise wasted light directed onto the pavement.

The refractor and the reflector may be adapted to practically any existing G-E suspension luminaire—for high-voltage circuits, G. E. recommends them on Form 72. A General Electric lighting specialist will be glad to assist in a study of local conditions—or write to General Electric, Schenectady, N. Y. The coupon will bring you a publication on the Form 79; if you haven't a copy, you should send for it today.

**GENERAL ELECTRIC**

*General Electric, Dept. 6A-201*
*Schenectady, N. Y.*

*Please send me publication GEA-2276A on the new Form 79 and 79R street-lighting luminaire.*

*Name* .....

*Street* .....

*City* ..... *State* ..... 500-185

# MANUFACTURING AND MARKETS

## Refrigerator Deal Involves $1,000,000

Another sales record was broken recently when a deal was closed involving a $1,000,000 cash purchase of Williams Ice-O-Matic electric refrigerators from the Bloomington, Ill., plant, of which C. U. Williams is president. This is claimed to be the largest single purchase of electric refrigerators ever made. The purchase was made by the Hearn Department Store, New York City.

Retail offering of these refrigerators, announced on June 1, marks a departure from its cash policy by the Hearn organization in that it will give credit terms of three years to customers. For the Williams company the deal was described as an experiment in cutting distribution costs from manufacturer to customer.

In a full-page advertisement in New York daily papers announcing the sale three sizes were offered. The smallest, or 4.2 cu.ft. size, was retailed at $77, the largest family size of 5.3 cu.ft. volume was announced at $99, while the de luxe, or 6.4 cu.ft. size, retailed at $119, according to the announcement. Hearn's will have exclusive handling of these refrigerators within 100 miles of the city.

To supply the quantity of refrigerators ordered by the Hearn store Mr. Williams said he has put his plant on a 24-hour production basis involving three shifts a day.

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### Clark Controller Expands

Announcement has been made that the Clark Controller Company, Cleveland, has purchased from the American Vitrified Products Company two acres of land for expansion adjoining the Clark plant to the north. As the first step in this expansion the company awarded a contract to the J. L. Hunting Company for a steel and concrete building 50 x 60 ft., with an L 30 x 50 ft., the permit value of which is $30,000.

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### Hotpoint Manual Issued

Lack of information on how to sell, install and operate electric water heaters will be no obstacle to this kind of load building when the new "Hotpoint Manual of Electric Water Heating," just produced by the Edison General Electric Appliance Company, gets into the hands and the minds of utility appliance salesmen. The manual is in six sections: Sales Instructions; Product Story of Hotpoint Electric Water Heaters; Estimating Customer Requirements and Tank Sizes to Use; Tank Output and Comparison of Fuel Consumption; Installation Data; and Monel Tanks. The manual is available in either the complete set or in separate sections at nominal cost.

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### Immediate Lighting Needed for 50,000 Miles of Highways

United States has 50,000 miles of highways that need immediate lighting if officials would decrease the rising tide of night accidents, D. M. Diggs, General Electric engineer, told the Western New York Safety Congress meeting recently at the Hotel Statler, Buffalo, N. Y.

Cost of this lighting would be only a little more than 5 per cent of the original cost of the highways, he pointed out in an illustrated talk. This would decrease night accidents from 15 to 36 per cent, these figures being the results obtained from lighted roads in other parts of the country, Mr. Diggs stated.

Referring to New York's plan to devote $12,000,000 annually for grade-crossing elimination, Mr. Diggs said that if such an amount were to be used for highway lighting 10,000 accidents a year could be prevented instead of 151, which he estimated would be the amount prevented by crossing elimination.

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## Refrigerator Sales Reach All-Time Peak

An all-time monthly high for electric-refrigerator sales was established in April, according to the National Electrical Manufacturers Association. Sales of household refrigerators in April totaled 276,721 units in the United States, 3,918 in Canada and 18,578 in other foreign countries, making total sales throughout the world 299,217.

The April total put sales for the four months at a new record of 796,294 for the United States, 7,953 units for Canada, 50,656 units for the rest of the world and the world total at 854,903 units. In April a year ago sales were 242,907 units in the United States. The first four months this year compared with 636,405 units last year.

Domestic sales in April had a value of $22,715,767, and the four months $65,280,881, against $18,529,362 and $49,537,284, respectively last year.

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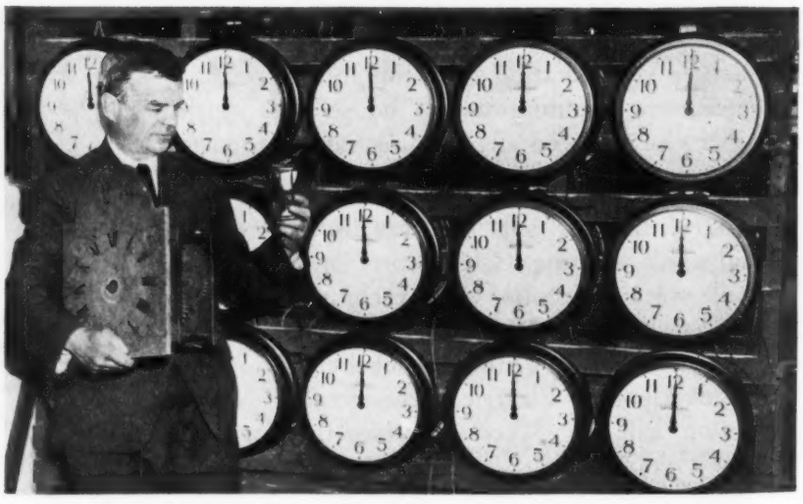
### Electrical Exports Exceed $8,000,000

Exports of electrical goods from the United States in March were valued at $8,130,575, according to advance official data announced by the Bureau of For-

### TIME-KEEPING EVOLUTIONIST



**In this 50th anniversary year of the utilization of alternating current, Henry E. Warren, noted inventor of electric clock mechanisms, frequency controllers and also president of the Telechron company bearing his name, ponders the evolution of timepieces in his Ashland, Mass., laboratory, from the Thirteenth Century hour glass through the Eighteenth Century hand-carved wooden geared clock down to the synchronous tickless unit of today**

# ...*and* That's Why Oil-filled Cable Was Born

## *...and how it has solved a knotty problem*

AFTER the depression of 1921-1922, load growth created an insistent demand for a better means of transmitting higher voltages underground.

What was the matter with ordinary solid-type paper-insulated cable? It was all right. But at high voltages it had its natural physical limitations leading to void formation and ionization.

### Out of the Pan into the Fire

Get more perfect impregnation! That was done, but it led to other troubles.

The insulation expanded when heated under load, put pressure on the lead sheath, which stretched and sometimes split. When the cable cooled, the compound shrank—but the sheath did not follow suit—voids developed, vacuum was created, air and moisture were sucked in.

### What to Do?

Accept these troubles as inherent? No!

Research—plus more research—led to these findings:

Use a liquid oil instead of a heavy compound.

Provide feed channels to allow the oil to flow back and forth as the cable heats and cools—and thus prevent void formation.

Keep the oil at the lowest possible positive pressure.

Control that pressure to prevent undue strain on the lead sheath.

There you have the oil-filled cable system. It retains all the good features of the solid-type yet eliminates those that handicap solid-type at the higher voltages.

And note: installation is about the same as with solid-type. Cable is shipped on reels. It is drawn into ducts in exactly the same way and in exactly the same kind of conduit system. Simplicity and reliability!

### Now, Too, Better Lead

Improvements in the art of making lead sheath have resulted in processes that eliminate oxides, insure perfect welds, and produce sheaths free from imperfections and of durable quality.

### What of the New Era?

As the world again recovers from a depression, loads are building up. How long will your present cable system suffice? When you come to decide on cable, just look at the record of oil-filled—825 miles in service without a single electrical failure. Study, too, the improvements that have brought new savings. With oil-filled, you get a simple, reliable, and economical cable system. General Electric Company, Schenectady, New York.

520-71

**GENERAL ELECTRIC**

eign and Domestic Commerce and issued by the Electrical Division. Canada continues to be our leading customer, followed by the United Kingdom. Nine countries took goods to the value of more than $250,000, as follows: Canada $1,150,491, United Kingdom $1,098,619, Mexico $403,095, Union of South Africa $400,493, Brazil $329,365, France $316,657, Argentina $277,781, British India $263,415, U. S. S. R. $257,931.

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## Paragon Electric Completes Expansion Program

Another index pointing to the improvement in business conditions is the announcement made by the Paragon Electric Company, Chicago, of the completion of an extensive factory expansion program at their plant in Manitowoc, Wis. To provide for this expansion Paragon has practically doubled its floor space. This new unit has been equipped with a complete new battery of machines, automatics and semi-automatics, gear cutters, millers and all necessary precision machines, so that the capacity of the production line on Paragon time switches has been trebled.

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## Wagner Electric Dividend

A dividend of 50 cents on the common stock of the Wagner Electric Corporation was declared last week. In the previous quarter 25 cents was paid.

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## Industrial Exhibition Staged in Buffalo

The first annual industrial equipment exhibition conducted by the Industrial Committee of the Electrical League of the Niagara Frontier was held recently in Buffalo. A total of 40 booths was taken by 23 different exhibitors, displaying a vast array of electrical items of interest to industrial plant executives. Upward of 2,500 industrial men, purchasing agents, plant managers, superintendents, electricians and others attended the show. A survey of the exhibition indicates that the show was a tremendous success as a business-building venture as well as an educational activity.

## New York Metal Prices

| | May 26, 1936 Cents per Pound | June 3, 1936 Cents per Pound |
|---|---|---|
| Copper electrolytic | 9.50* | 9.50* |
| Lead. Am. S. & R. price | 4.60 | 4.60 |
| Antimony | 12.25 | 12.25 |
| Nickel ingot | 35.00 | 35.00 |
| Zinc spot | 5.275 | 5.275 |
| Tin Straits | 45.75 | 44.00 |
| Aluminum, 99 per cent | 19—21 | 19—21 |

*Delivered Connecticut Valley.

## Driver Harris Earnings Up 30 per Cent

Earnings of the Driver Harris Company thus far in 1936 have been approximately 30 per cent larger than a year earlier, F. L. Driver, president, announced last week at the annual meeting in Harrison, N. J.

A special meeting of stockholders of the company has been called for June 2 to consider a new issue of 192,000 shares of 5 per cent participating preferred stock to retire about $700,000 of funded debt and $1,023,000 principal amount of 7 per cent preferred stock. The new shares will be of $10 par value, with annual cumulative dividends of 50 cents a share, after which they will participate as a class equally with common stock after the common has received dividends equal to the regular preferred payment.

# Field Reports on Business

*Reports to* ELECTRICAL WORLD *from the field indicate that business has been yielding a few more microscopic concessions to the season's normal tendency of recession in industry. However, such important indexes as steel production, construction, retail trade and electric energy output continue to display a notable firmness in the face of election year political annoyances and the mad tax scramble in Washington.*

### CHICAGO

Business activity was well maintained last week, closing the month of May in unusually stable fashion. After a period of coasting the pace accelerated enough to reach the peak set at the first of the year. Study of the current picture in relation to last year's experience incites considerable optimism inasmuch as business continues to advance at a rate of 18 per cent faster than in 1935.

Although the power output in the Chicago area declined slightly last week, the decline was less than seasonal. Retail trade expanded and car loadings were up over the previous week. Residential construction continues at the highest level since 1931. Among orders reported last week are 22,000 ft. of 3½-in. fiber conduit, 10,500 ft. No. 8 conductor, and 14,000 ft. No. 12 conductor rubber-insulated-lead sheathed feeder cable. Orders for motors and control apparatus are steady. Sales of wire and wiring devices show an increase. Conduit and fittings are moving nicely. Interest in air conditioning steadily increases.

Figures obtained from a recent survey made by the Illinois Manufacturers Association show 29 industrial firms definitely employing more men than in 1929. Analysis of all manufacturing industries in the state shows employment of 85 per cent of the number on the payrolls in 1930, before the unemployment problem became acute.

### NEW ENGLAND

Interest in heavy power equipment is growing throughout this district and orders recently placed include a 7,500-kw. turbo-generator for a Connecticut utility and two 200-kw. turbo-generator units for government use; negotiations are under way for other units of this kind. Small motor sales are advancing and, according to one prominent manufacturer, will show a marked increase for the first six months of the year over a corresponding period of last year. U. S. Government buying, together with a tendency toward industrial expansion, is given for the reason for an encouraging pace in electrical equipment orders.

Small switches and control apparatus are selling in good volume; street lighting is active and electrically controlled traffic signals will be purchased soon for eight street intersections in Boston. Wiring for residences is reported in good volume with heavy demands for wire, cable and socket devices.

Merchandising is strong throughout this district, with Vermont districts pointing to marked gains in sales as compared with last year. One group of central stations records 111 refrigerator sales for the past week, making a total of 1,900 such units to date.

### NEW YORK

Exceptional stability continues to characterize the business situation in this region, even though some further recessions of a seasonal nature are necessarily being reported. The important steel production indicator is creeping forward again and expansion in operations are predicted this month as users take deliveries to get in ahead of third quarter price advances.

Highly encouraging, too, is the latest report on electric energy output which, despite the Memorial Day interruption, declined only moderately while the margin of increase over the preceding year was shooting up to 18 per cent, the highest advance recorded in fourteen months. Less favorable are current estimates on other major indexes such as car loadings, but business sentiment, nevertheless, is predominantly optimistic.

Sporadic price wars in some consumer lines and tax turmoil in Washington continue to be the unsettling influences.

### PACIFIC COAST

May business fell about 10 per cent below April figures, but rounded out an excellent quarter, the best three months since the spring of 1930. However, the volume of unfilled orders has sharply dropped, which fact coupled with decrease in value of prospective business, apparently forecasts a rather poor June and a poorer July after which favorable natural factors and such big awards as bridge exposition building and bridge railway construction will assert themselves.

Power companies are buying briskly of all staple maintenance and extension material and contrary to expectation in view of steady high demand for transformers and meters are building up a peak demand on these. The interurban car equipment for the Bay Bridge is to be purchased early in June, with about a million dollars' worth of signaling equipment including $100,000 of wire apparently slated for July award.

San Francisco is to place about $8,000,000 of exposition construction. Building construction still features schools both north and south, with special lighting and wiring material almost ready for installation in university additions.

# AUTOMATIC NEWS SWITCHING

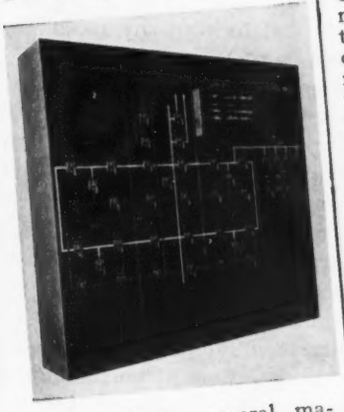
JUNE, 1936 — SWITCHGEAR HEADQUARTERS — ★★★★★


# CONTROL FOR WORLD'S LARGEST CONDENSERS

## SYSTEM MAP AND CONTROL FOR BIG MILL

Perhaps the most complete automatic-switching system in steel-mill history is a G-E installation in Pittsburgh.

This equipment centralizes, in the electrical superintendent's office, control of the entire plant's high-voltage a-c distribution system.



Control for several machines in an adjacent substation is also combined at this point with the high-voltage control for the general system.

## G-E THROW-OVER EQUIPMENTS HANDLE HUNDREDS OF JOBS

Not all baseball players can be big-league stars, and not all automatic-switching installations can be spectacular.

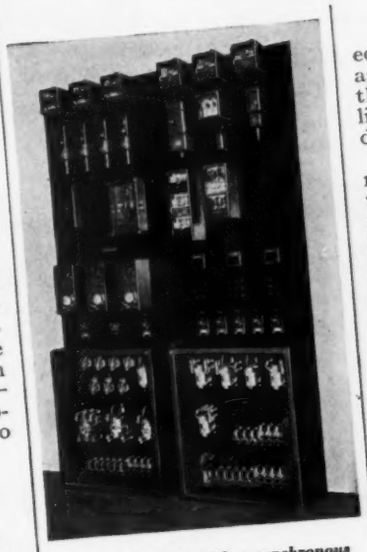
General Electric is just as proud of its thousands of standard automatic switching applications as of its more complex apparatus for highly specialized jobs.

One example of standard G-E equipment is the automatic preferred-emergency throw-over. Literally hundreds of these equipments are rendering valuable service on the nation's power systems—guarding against interruptions in the flow of power to customers.

### G-E Engineers Will Help You Plan Your Automatic Equipment

When you are planning automatic-switching installations, you may find it profitable to take advantage of our experience in designing and building all types of automatic-switching apparatus. Just call the nearest G-E office. General Electric Company, Schenectady, New York.

## LOS ANGELES INSTALLS 60,000-KVA UNITS FOR VOLTAGE REGULATION



*Control for 60,000-kva synchronous condenser*

G-E automatic-switching equipment has just received another major assignment—this time, the job of controlling the world's largest hydrogen-cooled condensers.

These giant machines, each rated 60,000 kva, 13,800 volts, 60 cycles, are installed at the Los Angeles end of the 287-kv lines, from Boulder Dam, of the Bureau of Power and Light, City of Los Angeles. Each machine has a lagging capacity of 36,000 kva—needed for regulation of 270 miles of lightly loaded, high-voltage line.

Upon indication from the main control room, the condensers will be automatically started and put on the line. All necessary automatic protective and indicating features are incorporated in the control equipment.

## RANGE: 9 TO 11,000 AMPERES

A large utility company wanted fully automatic control for its large battery-charging substation—capacity, 125 battery trucks. Three generators were to be installed.

General Electric, co-operating with the power-company engineers, designed an automatic, load-responsive starting and stopping system that will carry an 11,000-amp load (without overheating) yet have the load-responsive stopping control function all the way down to 9 amperes.

As a result, the substation functions perfectly without attention, regardless of when trucks are brought into, or taken out of, the garage, and regardless of how many are being charged at one time.

## 100,000 KW—TWO MEN IN CHARGE

The conventional large switchboard is eliminated in the 100,000-kw Ohio Falls Hydro Station.

Control is centralized in a small control and instrument cabinet at the supervisor's desk; the control and instrument *apparatus* is placed in individual compartments adjacent to the generators.

The supervisor, from his desk, determines and controls the condition of every generator. The floor man, upon indication from the supervisor, starts individual machines merely by moving the gate limit stop in the turbine governors.

880-1

GENERAL ELECTRIC

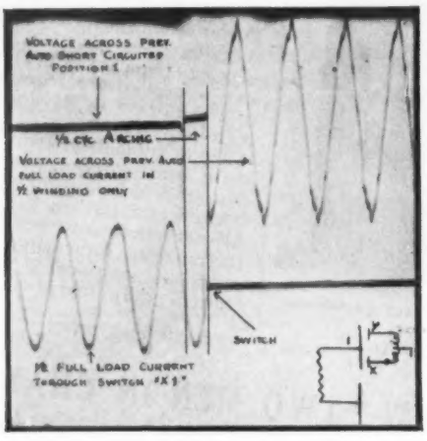
# NEW ENGINEERING IDEAS

***Discoveries, proposals and developments by electrical engineers and scientists in the field, the factory and the laboratory***

## Ingenious Design Aids Tap Change

By F. L. SNYDER
Transformer Engineering Department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

In the design of load tap changers for step-voltage regulators it is desirable to arrange the transfer or load switches so that the arc is extinguished at the first current zero. In order to accomplish this result it is necessary


VOLTAGE ACROSS PREV. AUTO SHORT CIRCUITED POSITION 1
½ CYC. ARCING
VOLTAGE ACROSS PREV. AUTO FULL LOAD CURRENT IN ½ WINDING ONLY
SWITCH
½ FULL LOAD CURRENT THROUGH SWITCH "K1"

**Voltage and current handled by transfer switch**
Note that arc is extinguished at first current zero.

that contacts move away from each other at such a speed that the dielectric strength of the insulating medium is greater than the arc recovery voltage across the contacts after the first current zero. This aim has been accomplished in the newer designs of Westinghouse regulators by the use of an improved transfer switch design.

A solidly connected mechanical drive operates the entire moving contact element so that it attains the constant speed desired before the contacts open and so that the contacts make before the moving contact element starts to come to rest. With this method the moving current-carrying contacts are always under full control. There is no mechanical shock in either starting or stopping the moving contact element. With the elimination of cams, spring mechanisms, followers, latches, stops, etc., a much simpler mechanism is obtained and one much less likely to get out of adjustment. This type of mechanism is particularly adapted to those schemes of tap changing where one moving contact opens and closes consecutively on a series of stationary contacts.

In determining the design constants for this regulator it was first necessary to determine the maximum arc-kva. to be handled by the transfer switches, and then to determine the contact separation required after current zero. Finally, it was necessary to design the mechanism so that the moving contact separated from the stationary contact the required distance to prevent the arc from restriking in one-half cycle.

To accomplish this last result it was necessary to use a wedge and finger type contact and to have the moving contact element remain in full contact with the stationary contact element until it had attained constant speed. Further, the moving contact element must not start to decelerate until after it has made full contact with the next stationary contact element.

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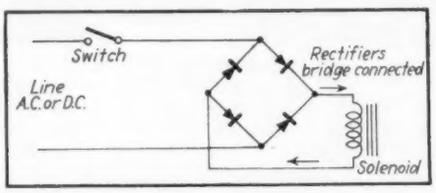
## Bridged Rectifiers Stop Contact Burning

By L. L. DAVIS
Kansas City Public Service Company, Kansas City, Mo.

Voltage induced in the coil of a d.c. solenoid, when the circuit is opened, tends to maintain current in the coil and often produces objectionable burning at the control contacts when operation is frequent as is the case with demand attachments on watt-hour meters, magnetically controlled clocks, etc.

A bridge-connected rectifier circuit which has been in use for two years to supply a large magnetically operated clock at the Atlas Lumber Company,




**Rectifier circuit used to eliminate control contact burning caused by repeated solenoid operation**

Kansas City, has successfully eliminated this reaction burning effect. The solenoids are energized from a 110-volt, 60-cycle source through copper-oxide, bridge-connected rectifiers. With this arrangement, shown in the accompanying diagram, stored energy is dissipated in the form of heat in the closed circuit. Without the bridge the induced voltage appears across the contacts, usually causing objectionable burning.

•

## Obtain Colored Light by Fluorescence

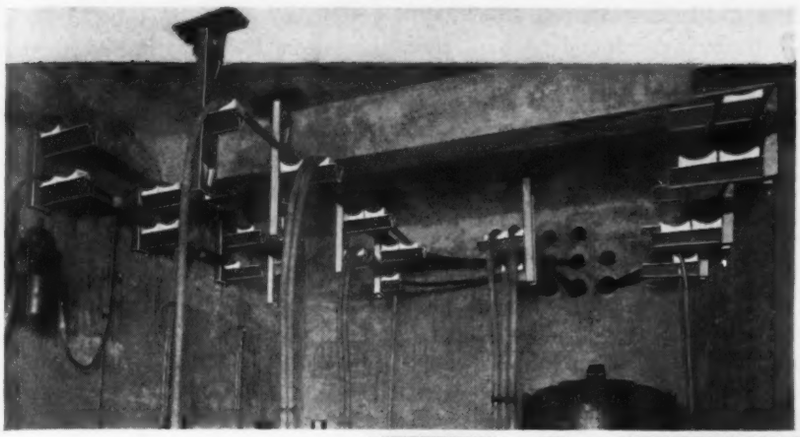
Fluorescent properties of certain chemicals such as rhodamine and anthracene under ultra-violet light have been known to lighting engineers for some time. These properties have now been put to work by recent development work of the General Electric Company at Nela Park, Cleveland. Low-pressure tubular mercury-vapor lamps, similar in appearance to the familiar "Lumiline" lamps, are now being developed which produce visible colored light by the action of invisible ultra-violet light rays on a special chemical coating on the tube.

For the electrical energy used these fluorescent lamps are said to give from 50 to 200 times as much colored light as colored incandescent lamps. The great gain in efficiency claimed over the present colored incandescent lamps lies in the transformation of invisible radiation into visible light of one color, whereas the brilliant filament of the incandescent lamp emits light made up of all colors. To obtain a single color from an incandescent lamp the other colors had to be absorbed. No matter how efficiently an incandescent lamp may be in producing its continuous spectrum, it cannot as efficiently produce light of a single color at low wattage consumption, it was declared.

Light colors thus far produced with fluorescent lamps are green, blue, old rose, and a "north-sky white," which is said to rival the light obtained by combination of incandescent and mercury-vapor light, now being widely used in commercial and industrial installations to simulate daylight.

Green fluorescent light is obtained by the use of zinc silicate, blue by the

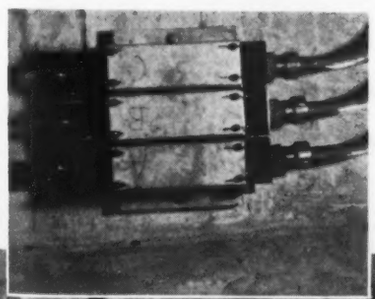
# TIME TESTED



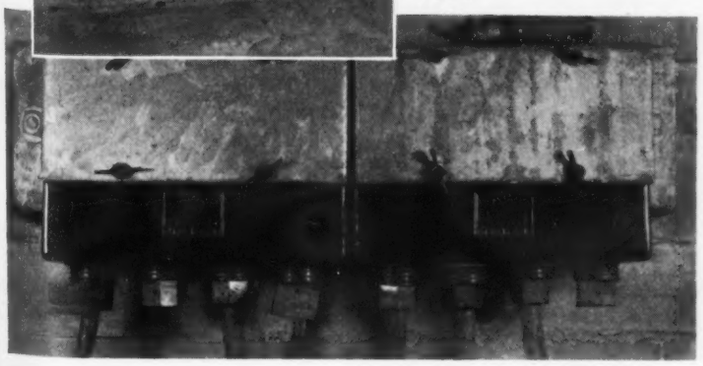
*Murray Cable Racks available in many types to meet wide variety of uses. Rack shown is Type A Heavy Duty and provides porcelain insulation between cable and arm. Allow for quick and inexpensive rearrangement of cables in existing manholes or for the addition of new cables.*

*Murray Cable Joints for high tension cables — all material for making a joint supplied in standard package. Sleeves, which have triple seal bushings, supplied separately if desired. For potentials from 2.3 to 33 KV., current carrying capacities up to 750 amperes.*

*Cable protectors for duct end installation.*



*Murray Sectionalizing Units for low tension networks— illustrated to left — unit for segregating feeders coming from two supply sources where either end could be disconnected from the ring without interrupting the load. Illustration below shows unit for disconnecting any branch circuit without disturbing the supply.*



## RACKS, JOINTS AND SECTIONALIZING UNITS

### For Underground Distribution

For more than 33 years, Murray Distribution Devices have been proving their all-round efficiency in the underground systems of many of America's largest central stations. The name Murray is thus backed by a widely known reputation for quality and durability. To assure years of dependable service, specify Murray when ordering cable racks, cable joints, sectionalizing units, monolithic conduit and cable protectors.

*Write for catalog*

METROPOLITAN DEVICE CORP.
BROOKLYN—NEW YORK

# MURRAY DISTRIBUTION DEVICES

**Tubular lamps yield colored light by fluorescent action of ultra-violet light on chemical coating**

use of calcium tungstate, red with calcium silicate and the "north-sky white" by the proper combination of these three chemicals, it was declared.

•

# New Data on Radio Atmospherics

From the very beginnings of radio reception disturbances commonly spoken of as "static" have been recognized. From the very nature of radio transmission and from the known possible presence of several other types of aerial electromagnetic phenomenon, of which the most conspicuous is lightning, it was, from the beginning, easy to account for static in this roughly qualitative way. Moreover, as time has gone on a great deal of more or less direct evidence has been accumulated indicating certain relatonship between static and "atmospheric" discharges of the lightning type. However, direct experiments approximating a quantitative character have been wanting up to this time. Therefore a recent paper by H. Norinder (*Journal* Franklin Institute, May, 1936), well known for numerous contributions to our knowledge of lightning phenomena, on their relation to radio static will be received with great interest.

Using a portable antenna and a movable field station equipped with cathode-ray oscillographs, simultaneous observations were made with the loudspeakers of radio receiving sets and corresponding oscillograms. The existence of two characteristic variation forms of static in connection with thunderstorms were recognized. The first form, known as the "click," caused by single discharges of comparatively short duration, and, second, "grinders" having whistling or hissing sounds in the loudspeakers. The corresponding oscillograms were found to have the same characteristic forms found by Norinder to be typical of ordinary lightning discharges. A difficulty still remained, however, in the complicated forms of these oscillograms as related to the discharge forms pertaining to nearby electric strokes. To meet this, oscillographic records of "atmospherics" were also taken where the centers of origin were placed at much greater distances. These records showed well-recognized variation forms with more or less pronounced superimposed periodic variations. Using a transmission equation for radio waves, Norinder reaches the conclusion that static of typical variation form may be explained as originating in lightning discharges of known and uncomplicated form, the variations being caused by gradual deformation during transmission.

This work appears to confirm beyond question the nature of the origin of static and also to explain some of its outstanding peculiarities. One matter, however, is apparently unexplained, namely, the occurrence of static in the apparent absence of thunderstorms and lightning. We must assume from the author's discussion that local discharges not associated with the more common visible and audible manifestations of thunderstorms are also possible and indeed quite common. And, by the way, if you wish to be up to date and scientific in speaking of these matters, use the word "atmospherics" and not "static."

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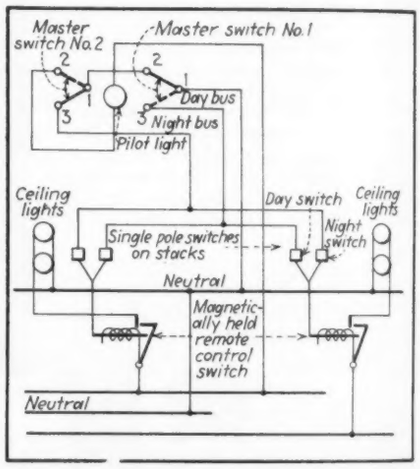
# Remote-Control Plan for Library Lighting

By RALPH E. JONES
New York State Electric & Gas Co.,
Endicott, N. Y.

Frequently the control of library lighting systems presents some interesting problems. Solution to one of these problems, wherein a remote-control system with master and individual controls was used to provide group operation of stack lights during the daytime and individual operation of these lights at night, is described herein.

Luminaires were mounted in or on the ceiling of the library room and each set of two lights operated through a remote-control magnetically held switch. A master control consisting of two single-pole, three-way switches, arranged as shown in the accompanying diagram, was employed to shift the system from daytime to night control, while individual switches on each stack control the individual light groups in that stack section. Neutral wires are used throughout for all controls.

When the janitor or watchman leaves at the end of the day he arranges the master switches so that any one who comes to the stacks for books may flip on one of the two individual single-pole switches on the stack concerned and then turn on the individual lights needed, turning them off on leaving. In the morning the master




**Remote control for stack lights in library permits individual or group control as desired**

Arrangement of master switches for night operation is shown by heavy lines. With this arrangement operation of the night switch on each stack will permit lights in that stack to be turned on individually. When master switches are arranged as shown by dotted lines operation of the day switch will turn on each group of two lights in the stacks affected. The system may be made "dead" by throwing switches 1 and 2 to connect points one and two. Operation of the pilot light will indicate that system is dead.

switches are again shifted so that any two lights in a single section of stacks can be turned on by flipping on the day switch in that particular section of stacks.

With this arrangement the number of lights in use at night is reduced to the minimum required by the readers and yet provides the same flexibility as in daytime operation. A further advantage is found in that the lighting system for the stacks can be completely shut off when the library is closed.

# INCREASES YOUR POWER LINE *Reliability*

The high dielectric strength of Western Red Celar poles affords additional insulation for the power lines they support.

Western Red Cedar pole lines have good performance records under lightning conditions—fewer outages—lower maintenance costs—higher revenue income—because they help maintain uninterrupted service.

Dry Western Red Cedar poles possess high insulating value—high tension live line maintenance or line changes can be undertaken at less hazard to linemen.

Standardize on these dependable poles for all your distribution and transmission line construction and replacements. Play safe—reduce construction and maintenance costs.

WESTERN RED AND NORTHERN WHITE CEDAR ASSOCIATION
Metropolitan Bank Building MINNEAPOLIS, MINNESOTA

NOTE THESE EXCLUSIVE QUALITY FEATURES OF WESTERN RED CEDAR—

- Western Red Cedar Poles are straight, strong, rigid, yet light in weight.
- Their large heartwood, preserved by nature, is highly resistant to decay and insect damage.
- Western Red Cedar combines, in one wood, more basic power line pole properties than found in any other pole timber.
- The natural preservative of Cedar is permanent . . cannot be varied, and is constant and effective from the top to the bottom of the pole.
- Additional gains can be added and holes drilled anytime after erection for joint use or for installation of additional equipment without endangering the life of the pole.

# CEDAR POLES

## *Construction and Maintenance*

# MEN OF THE INDUSTRY

## L. A. Williams Made Manager of Everett District

L. A. Williams, assistant to J. Frank McLaughlin, president of the Puget Sound Power & Light Company with headquarters in Seattle, has been named

manager of the company's northeastern district, with headquarters in Everett. Mr. Williams, who also held the title of promotion manager of the company, will succeed Frank Walsh, who has been transferred to the company's northern division, with headquarters in Bellingham. Mr. Walsh, in turn, succeeds W. M. Bird, recently chosen president of the Western Public Service Company, with headquarters in Scott's Bluff, Neb.

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▶ E. A. SHRIDER of Sidney was elected vice-president and general manager of the Ohio Electric Power Company at the recent annual election. Mr. Shrider was formerly vice-president in charge of the commercial department.

▶ W. J. DONALD, managing director of the National Electrical Manufacturers Association, was named vice-president of the Trade Association Executives of New York City last week at the annual meeting.

▶ JAMES M. SLATTERY of Chicago has been appointed chairman of the Illinois Commerce Commission by Gov. Henry Horner. The new commissioner served as attorney for the Lincoln Park Board until Chicago's park districts were consolidated, and has since served the consolidated district. He succeeds Benjamin F. Lindheimer, resigned.

▶ COLIN F. CHISHOLM, vice-president of the Suburban Gas & Electric Company, Revere, Mass., and for the past 20 years secretary of the Revere Chamber of Commerce, was given a testimonial dinner on May 21 in the auditorium of the Revere City Hall by civic and company associates in honor of his long service in local enterprises. Mr. Chisholm entered the electrical industry 53 years ago, and after spending seventeen years with the North Shore Electric and Thomson-Houston Electric companies, joined the Suburban company, of which he later became manager, and more recently vice-president.

▶ EDWIN H. SOLLOWS of Yarmouth, Nova Scotia, has been appointed superintendent in charge of the Western Nova Scotia Electric Company, a subsidiary of the Nova Scotia Light & Power Company. Mr. Sollows has been on the staff of the Western Nova Scotia Electric Company for the past 20 years, and for the seven years preceding his recent appointment had been distribution superintendent.

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## Nikola Tesla Honored at 80

Nikola Tesla's eightieth birthday was celebrated on May 28 throughout Yugoslavia. In Belgrade in the university's large auditorium 70 delegates representing fifteen countries attended a special meeting honoring the noted electrical inventor and scientist. Regent Prince Paul conferred on Mr. Tesla the Grand Cross of the Order of the White Eagle. Mr. Tesla cabled his thanks to the gathering.

**M. W. Smith**

who has been appointed manager of engineering of the Westinghouse Electric & Manufacturing Company (ELECTRICAL WORLD, May 30, page 13). Mr. Smith has been connected with Westinghouse interests since 1915.

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▶ ERNEST T. LINK has been elected treasurer of the Superior Water, Light & Power Company, Superior, Wis. Mr. Link has been connected with the company since 1910 with the exception of a few months.

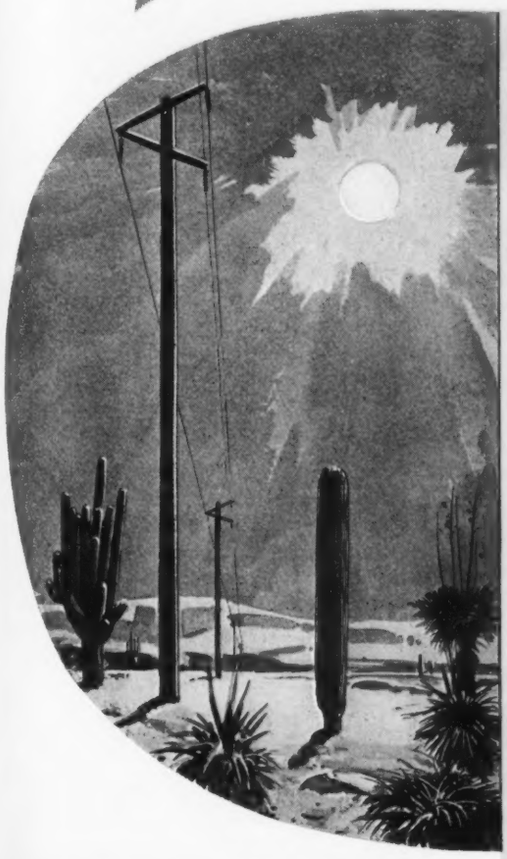
▶ THOMAS H. CARENS' promotion to the position of vice-president of the Boston Edison Company in charge of public relations was celebrated on May 23 by a banquet at the Clover Club, in the Massachusetts capital, featured among other things by a special front-page edition of the Boston *Globe* devoted to the career of the guest of honor and by the conferring of the "degree" of Doctor of

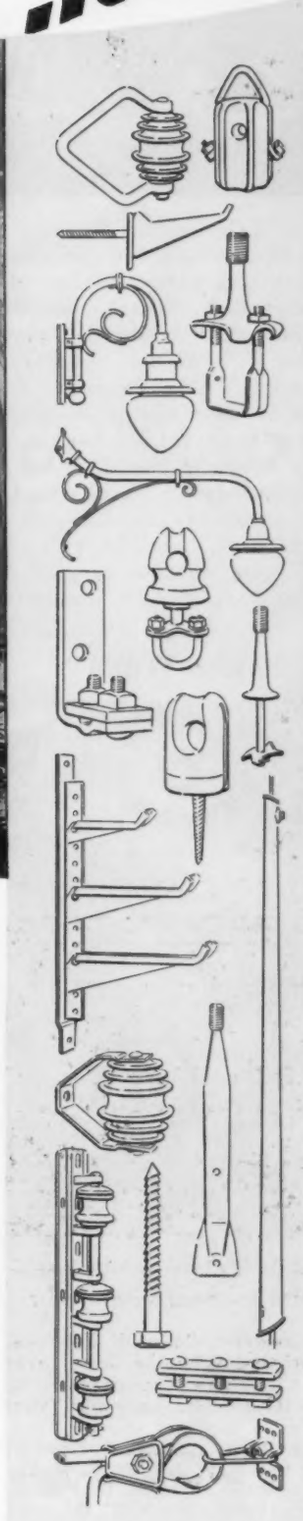
## TWO NOBEL SCIENTISTS MEET

*General Electric*

**Dr. A. H. Compton (left), physicist at the University of Chicago, and Dr. Irving Langmuir (right), associate director of the General Electric Research Laboratory at Schenectady, inspect some of Dr. Langmuir's laboratory equipment for studying monomolecular and thin films. The scientists are both Nobel prize winners.**

# from blister ...to blizzard





When Pole Line Hardware is designed and manufactured, many elements with respect to its later service must be considered. There are the obvious requirements of size, weight and strength, all of which are straight-forward calculations based on known conditions such as length of span, ice loading, soil conditions and a hundred-and-one other circumstances familiar to the experienced engineer.

But there is another and more subtle influence with which uninterrupted service must cope, one which works slowly and irresistibly, a devastating force which is impossible of accurate calculation or prediction.

Old Mother Nature and her spouse, Father Time, in their conniving, concoct an endless variety of hazards to test the skill of man. They burn, freeze, expand and soak. They alkalize, acidify, electrolize and oxidize. They may strike sudden, rending blows or they may work together for years before their invisible ravages are discovered.

Nature can not be completely conquered, but the degree to which she is checked can be taken as a measure of the quality of Pole Line Hardware.

From the burning, tropical heat of desert sands to the sub-zero wastes of snow capped mountains, Hubbard Non-Porous, Double-Dip, Hot Galvanizing successfully holds Mother Nature in impatient abeyance while Hubbard Hardware carries the load.

**Hubbard**
*and* COMPANY

PITTSBURGH · OAKLAND, CAL. · CHICAGO

Public Relations by Commissioner Leo H. Leary of the state Department of Public Utilities. It is a safe guess that none of the tributes received by Boston Edison's newest high executive were more appreciated than this offering from a former rival publication in the Fourth Estate.

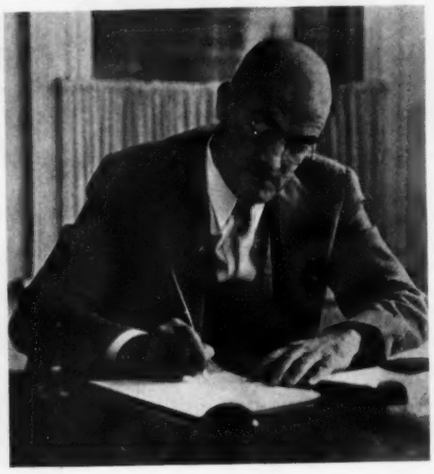
▶ MAYOR J. T. HOLLINGSWORTH has been appointed manager of the Camden plant of the Tennessee Light & Power Company.

▶ JOHN B. MCMILLAN, a member of the House of Representatives from Allendale County, was elected by acclamation in the South Carolina General Assembly to succeed S. C. Blease, resigned, on the State Public Service Commission.

▶ BREWSTER S. BEACH, for the past six years director of advertising, sales promotion and publicity, Carrier Corporation, Newark, N. J., has announced the organization of a service in publicity sales promotion with headquarters in the Chrysler Building, New York.

▶ WILLIAM V. PRICE, district manager of supply sales, General Electric Supply Corporation, Boston, has been made president of the Metropolitan Electrical League of Boston, and L. T. MAHONEY, sales manager General Equipment Corporation, Boston, has been elected vice-president. J. J. Caddigan continues as secretary-treasurer.

## C. A. Brann Named New Woonsocket Manager



Charles A. Brann, for 21 years connected with the Stone & Webster organization, has been named manager of the Woonsocket, R. I., division of the Blackstone Valley Gas & Electric Company to succeed W. L. Weston, resigned. Mr. Brann goes to Rhode Island from Texas, where he has been vice-president of the Community Power & Light Company. He is widely known in New England, having been manager of the Electric Light & Power Company at Abington and Rockland, Mass., from 1930 to 1934.

Mr. Weston, who has resigned from the Woonsocket division managership, was formerly identified with the Cape Breton Electric Company. Most of his life has been spent with the Stone & Webster organization.

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▶ EDWARD J. HANLEY, assistant superintendent of the wire and cable department of the Schenectady Works of the General Electric Company, has been appointed secretary of the Allegheny Steel Company with headquarters at Brackenridge, Pa.

▶ EDWIN H. SCHMITZ, for the past eleven years connected with the Riley Stoker Corporation, and recently manager of its New England district office at Boston, has joined the staff of C. H. Sprague & Sons, Boston, as combustion engineer. Philip R. Delphos is now in charge of the Boston office.

▶ JAMES H. RODGER, formerly in charge of sales in Chicago for the American Creosoting Company and later outside construction field representative, Chicago district, for the General Electric Supply Corporation, Bridgeport, Conn., has become associated as sales manager with the Naugle Pole & Tie Company, Minneapolis, Minn.

▶ PROF. EDWIN F. GAY, first dean of the Harvard Graduate School of Business Administration and a pioneer in American business education on the professional plane, has resigned as Henry Lee Professor of Economic History and will retire September 1. He has been a member of the faculty since 1902 and is widely known in business, industrial and governmental circles for his brilliant contributions to the study of marketing, statistics, transport, retail and wholesaling problems.

▶ BLISS G. SINCLAIR, a member of the Department of Public Service of Washington State for the past nine years, has been appointed assistant chief engineer of the department. He takes the place of Carl D. Pollock, who resigned to accept an appointment with the West Virginia Public Service Commission. Mr. Sinclair has recently acted as office engineer and investigator, participating in recent valuation and rate investigations.

▶ DR. ARTHUR E. WATSON, senior professor in the department of electrical engineering at Brown University, Providence, R. I., will retire at the end of the current academic year after 40 years of service in the physics and electrical departments. Dr. Watson was born in Orleans, Mass., in 1866, and after receiving his bachelor, master and doctor's degrees at Brown spent seven years with the Lynn works of the then Thomson-Houston Electric Company, and General Electric Company. He taught for a short time in Lynn and became an instructor

## GREAT LAKES EXPOSITION TAKES FORM

**A few of the members of the Great Lakes Exposition Executive Committee and guests on a recent tour of inspection of the exposition grounds.**

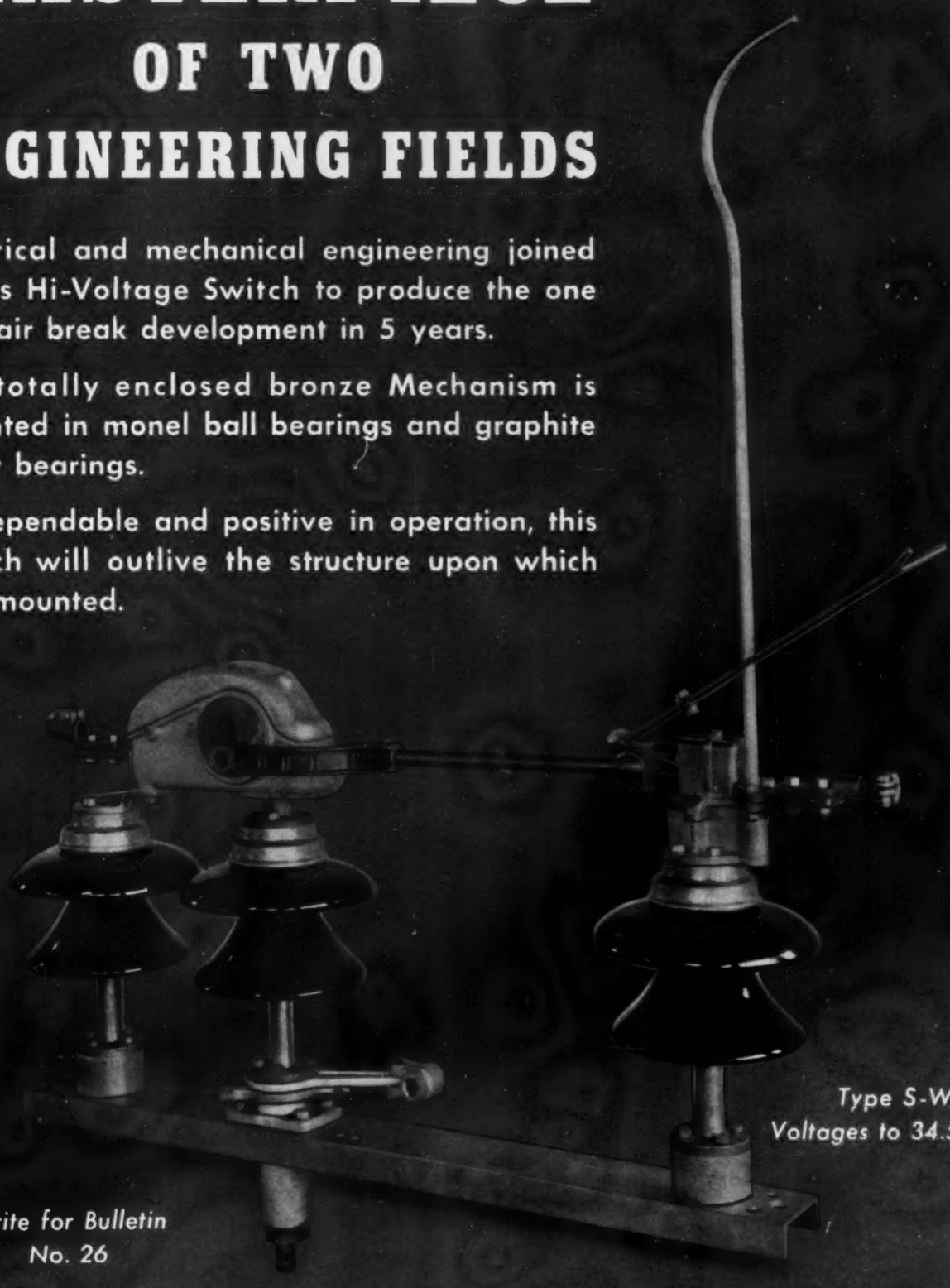
Left to right: Elton Hoyt II, Pickands Mather & Company; Robert F. Bingham, Thompson, Hine & Flory; Marty Laigle, field superintendent of the Great Lakes Exposition; Randolph Eide, president Ohio Bell Telephone Company; S. E. Hunkin, vice-president Hunkin-Conkey Company; Calvin A. Lohmiller, vice-president Hunkin-Conkey Company; Franklin G. Smith, president Osborn Manufacturing Company; A. C. Ernst, managing partner of Ernst & Ernst; Eben G. Crawford, president Cleveland Electric Illuminating Company; Lincoln G. Dickey (pointing), general manager of the Great Lakes Exposition; Vernon H. Pribble, manager of radio station WTAM; William S. Hedges, manager NBC Operated Stations, and Paul Bellamy, editor of Cleveland *Plain Dealer*.

# MASTERPIECE
## OF TWO
## ENGINEERING FIELDS

Electrical and mechanical engineering joined in this Hi-Voltage Switch to produce the one new air break development in 5 years.

The totally enclosed bronze Mechanism is mounted in monel ball bearings and graphite insert bearings.

So dependable and positive in operation, this Switch will outlive the structure upon which it is mounted.



*Type S-W*
*Voltages to 34.5 K. V.*

*Write for Bulletin*
*No. 26*

**HI-VOLTAGE EQUIPMENT CO.**

2891 EAST 79TH ST., CLEVELAND, OHIO

**Lower Cleaning Costs on Globes, Reflectors and Insulators**

*with* **Skybryte**

**The Original Glass Cleaner**

Every pound of Skybryte 2-x Crystals makes three gallons of the *original* chemical glass cleaner. Skybryte may be used either as a dipping bath or with a sponge. The most stubborn dirt and grime are completely dissolved leaving a clean sparkling surface.

The use of 2-x Crystals has many advantages over the use of solutions bought in liquid form. (1) The cost of the material is less (2) the freight charges are lower (3) there can be no loss or damage due to leakage and (4) the solution can be mixed right on the job.

For 20 years Skybryte has been sold on a guaranteed money-back basis and for 20 years has been the leading brand of chemical glass cleaner. Such success can only come from satisfied customers.

If you are not already using Skybryte to clean your globes, reflectors and insulators, find out now how you can do the job in less time and at less cost than your present method. If you are not *completely* satisfied with the performance of Skybryte the test will cost you nothing. We will ship your initial order freight prepaid and stand or fall on the results.

| PRICES F.O.B. CLEVELAND | |
|---|---|
| 250 lbs. | 40c per pound |
| 100 lbs. | 50c per pound |
| 50 lbs. | 55c per pound |
| 25 lbs. | 60c per pound |

THE SKYBRYTE COMPANY
CLEVELAND OHIO

***Also manufacturers of Rust-tox, the proven material for painting rusted metal without removing the rust.***


in physics at Brown in 1895, becoming assistant professor of electrical engineering in 1914 and associate professor in 1920.

▶ H. L. BUCK, who has been associated with Day & Zimmermann, Inc., Philadelphia, Pa., is now employed by the I-T-E Circuit Breaker Company, Philadelphia.

▶ ALEXANDER C. FORBES and HUGH J. PRITCHARD were elected last week members of the board of directors of the Engineers Public Service Company.

▶ HAROLD R. ELDREDGE, formerly secretary-treasurer of Curtis Lighting of New York, Inc., has been appointed New York sales manager of Curtis Lighting, Inc., to be in charge of all Curtis sales activities in the Metropolitan New York district.

▶ GEORGE O. O'HARA has joined the sales department of the Detroit Electric Furnace Company. Since 1930 he has been with the electrode division of Republic Carbon Company and its successor, National Carbon Company.

▶ L. E. MUSTARD has been appointed district manager of the Bristol Company's branch office in Detroit. To his new responsibilities and duties Mr. Mustard brings a rich background of experience in the application of instruments and automatic control to industrial operations. He started his business career with the Westinghouse Electric & Manufacturing Company. He joined the sales and service organization of the Bristol Company in 1923, and in the years that followed was associated with the Pittsburgh, Denver and St. Louis offices. During the past three years he served as sectional sales and service engineer, with headquarters in Dallas, Tex.

## OBITUARY

### Frank Blanchard

Frank LeRoy Blanchard, director of the advertising and news department of Henry L. Doherty & Company and the Cities Service Company from 1922 until his retirement in 1932, died May 30, of cerebral apoplexy, at his home in Brooklyn, N. Y. He was 77 years old. Early in his career he engaged in newspaper work and after entering the advertising field he attracted wide attention among business men for the constructive articles he contributed to advertising periodicals. From 1911 through 1916 he was editor of *Editor and Publisher* and was on the editorial staff of *Printers' Ink* from 1916 through 1919. It was in 1922 that he affiliated himself with the Doherty organization as director of public relations for the utility and oil properties of

*Now—*

# 1½ MILLION MORE FRIGIDAIRES

## have been sold than any other make!

*Proof* **that Frigidaire outlets are profiting handsomely by the greatest public acceptance ever awarded any refrigerator!**

● The men who sell Frigidaire in the field are setting new marks of achievement this year. They are climbing with Frigidaire to new peaks of leadership.

We are proud of this overwhelming leadership. Not alone because of the supremacy in sheer numbers which it represents. But because it signifies that we have kept faith with our original aim and principle—to make not merely a good refrigerator, but the world's finest.

"One and one-half Million More Frigidaires than any other Make" is to us a deep tribute of confidence from the buying public. And an inspiring reminder of record-breaking sales accomplishment by Frigidaire outlets everywhere in the world.

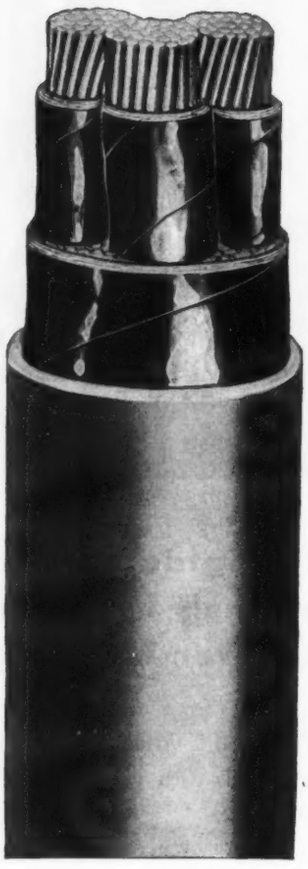
FRIGIDAIRE CORPORATION, Dayton, Ohio

G FRIGIDAIRE M
MADE ONLY BY GENERAL MOTORS

Make a good Job better with CRESCENT WIRE

SIGNAL CABLE
CONTROL CABLE
PARKWAY CABLE
MAGNET WIRE
RUBBER POWER CABLE
LEAD COVERED CABLE
VARNISHED CAMBRIC CABLE
WEATHERPROOF WIRE
ALL TYPES OF BUILDING WIRE

and all kinds of special cables to meet A.S.T.M., A.R.A., I.P.C.E.A., and all Railroad, Government, and Utility Companies' specifications.



The illustration shows a splendid example of CRESCENT manufacturing skill.

Varnished Cambric
Lead encased
POWER CABLE

CRESCENT
INSULATED WIRE & CABLE CO. INC.
TRENTON, NEW JERSEY.

the Cities Service Company with offices in New York.

Mr. Blanchard was a former president of the Advertising Club of New York, and of the Public Utility Advertising Association. He was a member of the National Electric Light Association, serving as chairman of the advertising section in 1927. He was also a member of the American Gas Association, the American Electric Railway Association and the Society for Electrical Development. Mr. Blanchard was born in Lewiston, Me., in 1858 and attended Bates College in that city.

► FERDINAND W. ROEBLING, JR., president of the John A. Roebling Sons Company, Trenton, N. J., died May 29 in New York after a month's illness. He was 57 years old. Mr. Roebling was a grandson of the late John Augustus Roebling, inventor of the suspension bridge, and began as an engineer in his grandfather's firm in 1901. He was appointed assistant secretary and treasurer in 1905, became treasurer in 1917 and president in 1926. Mr. Roebling was graduated from Lehigh University in 1901.

► FULTON G. FERAUD, pioneer Redlands, Calif., resident and one of the organizers of the Redlands Electric Light & Power Company, one of the predecessor companies of the Southern California Edison Company, died May 11 at East Orange, N. J. He was 79 years of age.

► HALPERT P. HILL, consulting engineer and President of Halpert P. Hill and Associates, died May 18 at his residence in New York, as the result of spinal injuries received in a fall in March. He was 62 years old. Mr. Hill was an authority on steam generating and power plant refrigeration engineering. He was formerly a partner in the old consulting engineering firm of Ophuls, Hill & McCreery. He was a fellow of the American Institute of Electrical Engineers and a member of the Franklin Institute of Philadelphia, the Society of Refrigeration Engineers, the Electrochemical Society and the New York Electrical Society.

► SAMUEL AUSTIN, founder and chairman of the board of the Austin Company, national organization of industrial engineers and builders, died May 23 at his residence in Willoughby, Ohio. He would have celebrated his 86th birthday on June 16. Widely known as an organization equipped to design, engineer and construct industrial plants from start to finish, the Austin Company has pioneered for several decades in standardized factory designs. Throughout his entire career Mr. Austin's interests were chiefly wrapped up in the affairs of the company and in the modernization and improvement of industrial building.

# Quick Heating!

## ...that's what you get from ranges with closed heating elements sheathed in Inconel*

*"Calrod" closed heating unit sheathed in Inconel.*

*General Electric "Imperial" range with two burner wing units, Monel Metal top, Inconel covering for its heating coils.*

● It's quick action that counts with buyers today . . . even with buyers of ranges. Show your customers how fast range elements sheathed in Inconel heat up, and you make more sales.

Point out the simple fact that the heating element wire is entirely inclosed and protected with a metal covering of Inconel. Let the customers see for themselves how the closed elements leap into action.

It is surprising how often *showing* people means *selling* them. That's why Hotpoint and G. E. use Inconel-sheathed heating units in their ranges.

More and more range manufacturers are turning to closed heating units and adopting Inconel as the sheathing material. There must be other advantages besides quick heating. There are:

Inconel is a Nickel-Chromium alloy. Tough, strong, wear resistant and stubbornly resistant to oxidation from heat. The closed element sheathed in Inconel gives long dependable service. The heating wires are protected, so boil-overs do not cause element failures. The children cannot tinker with the exposed wires.

Heavy kettles cannot harm Inconel. Rust cannot affect it . . . not ever. So the user almost never knows the annoying lay-offs and expense of repairs.

You make more sales by offering ranges with closed units sheathed in Inconel and you're sure of more steady use and greater loads on the line after you sell them. Both ways you profit.

• • •

For full information and names of range manufacturers who offer closed units sheathed in this durable Nickel alloy, address:

*Reg. U.S. Pat. Off.

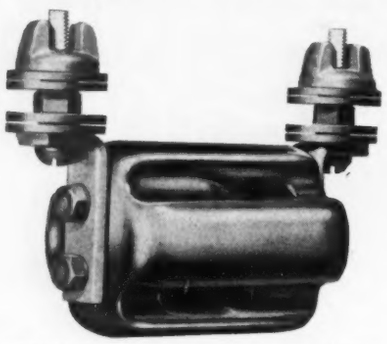
INCONEL

**THE INTERNATIONAL NICKEL COMPANY, INC.**
**67 Wall Street, New York, N. Y.**

# NEW EQUIPMENT AVAILABLE

## Secondary Fuse Holder

This unit was developed as a simple and practical means for fusing the secondary sides of transformers. It is applicable to small transformers where the primary fuses are extremely light and for mechanical



JH-260 secondary fuse, 200 amp. maximum. **Line Material Co.**, South Milwaukee, Wis.

reasons oversized fuses must be used. On these applications the secondary fuse acts as a protection to the transformer against heavy overload for secondary short circuits.

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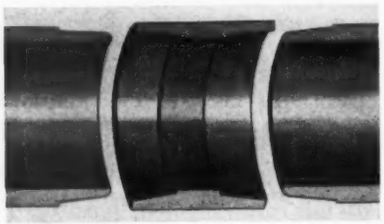
## Light-Weight Conduit

Thinner walls, reduced weight and easier handling feature a new line of fiber conduit developed for underground construction. The objective was to produce conduit at a lower price without lowering strength and toughness, utilizing cellulose fibers specially adapted to hard service. Savings of 30 per



"Bermico Dura-Cell" conduit; made in sizes from 2 to 5 in. diameter and 94-in. lengths; a typical size (4 in.) weighs 160 lb. per 100 ft.; wall thicknesses are 0.2 in. **Brown Company,** Portland, Me.

cent in weight and economies in handling, trucking, freight, storage and installation have been achieved. The conduit has met successfully severe tests by crushing, beam stress, dielectric, absorption, flattening, impact and heating. A non-splitting sleeve type coupling is used, with reinforcing fillet. Conduit butts firmly against the fillet, giving a tight joint and a smooth inside cable raceway.

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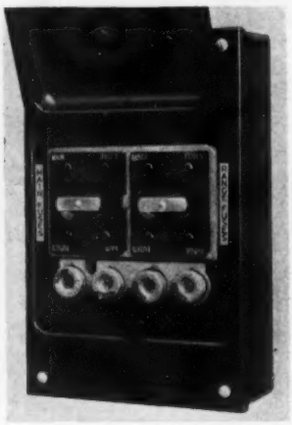
## Main and Range Switch

A combination main and range switch with facilities for four branch circuits has been made available which has several unique features. A single self-locking screw permits the switch assembly to be tilted forward or entirely removed, leaving



Bulletin 4334 H-15. **Cutler Hammer, Inc.**, Milwaukee, Wis.

the interior available for wiring. Dead-front construction and non-interchangeable pull-outs provide safety. Holes in the carrier block permit range and main fuses to be tested without removing them from the circuit. Branch circuit plug fuses are tested in the same manner. Approved type solderless connectors are used throughout, with porcelain barriers around all terminals to prevent accidental short circuits due to accumulation of dust and moisture.

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## Deïon Linestarter

Designed for across-the-line starting of single-phase and polyphase squirrel-cage induction motors and as primary switches for wound-rotor induction motors, this line of linestarters employs the Deïon principle of arc interruption. Motor protection is provided by a thermostat disk overload relay. Inverse time characteristics prevent shutdowns due to temporary overloads. Pro-

**Westinghouse Electric & Manufacturing Co.**, E. Pittsburgh, Pa.

tection is assured against single-phase and locked rotor operation. The contactor is compact and accessible. The entire assembly can be removed by loosening one screw which clamps the base against rubber pads.

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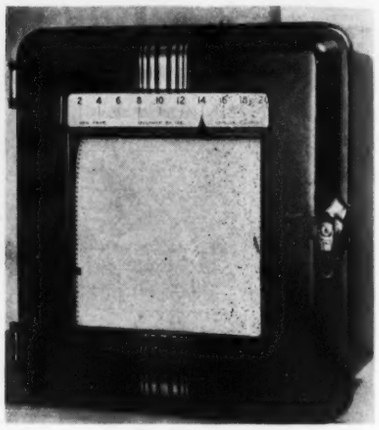
## Micromax Recorder

This device provides all combinations of indicating, recording, signaling and controlling in one instrument. A scale and pointer shows the conditions being measured at the moment and a record on ten visible inches of strip chart show it for a past period of several hours. On controllers a second pointer shows the control setting. A double frame is used in the design to provide accessibility to the mechanism. The instrument is designed as a recorder and controller for temperature, $Co_2$, smoke density, chemical strength, frequency, remote loads, etc.



Designated as the "silver anniversary recorder." **Leeds & Northrup Company**, Philadelphia, Pa.

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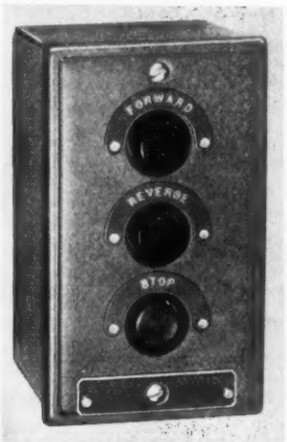
## Interchangeable Control Units

Interchangeable control units for push-button stations are now available that can be assembled in any arrangement desired for regular or special applications. Five interchangeable units form the basis of the line, which is intended for use in standard



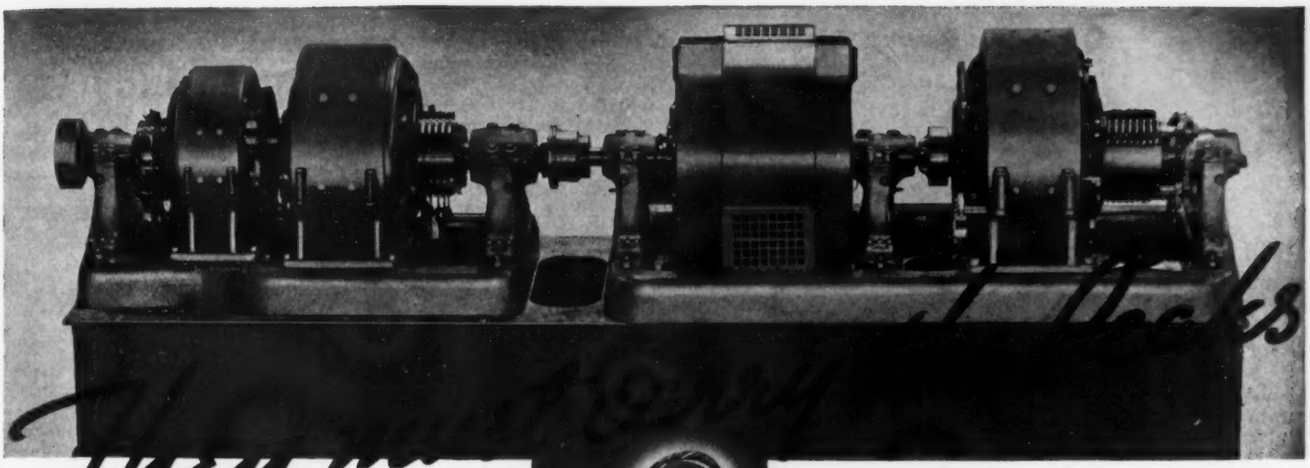

Capacity of all units 600 volts; housings available in steel, cast iron, for flush mounting or as separate units. **Arrow-Hart & Hegeman Electric Co.**, Hartford, Conn.

housings for one-, two- or three-button stations. These units are for operation (1) normally open (start), (2) normally closed (stop), (3) normally open and closed (jog), (4) two- or three-position transfer switches, (5) neon pilot light.

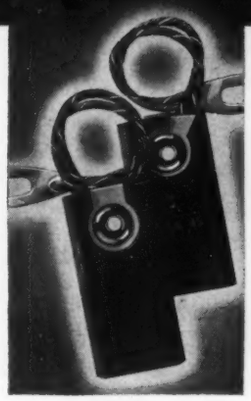
•

## Motorized Speed Reducer

Two new sizes have been added to this line of totally inclosed, fan-cooled, motor-driven speed reducers in both horizontal and vertical types. Planetary gear reduction design is used. All gears and shafts are mounted in anti-friction bearings. Lubrication in the horizontal type is by the



# They make it work

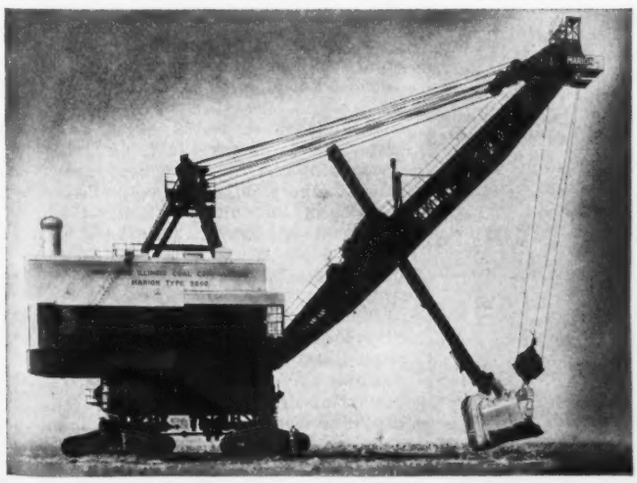


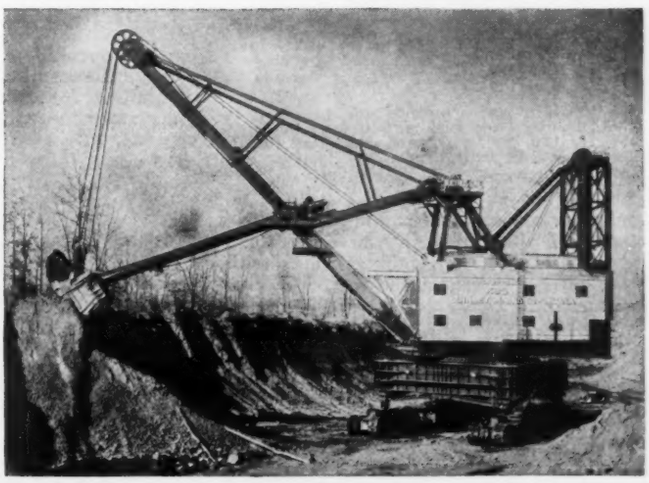
"SA" SERIES BRUSHES set a standard of performance on electric shovel generators never before attained. They carry extreme peaks day after day, reducing maintenance expense and eliminating interruption of service.

The generators on the huge electric shovels, used in the strip mining of coal, present one of the most difficult problems encountered in brush application. The loads are a succession of severe peaks, recurring at intervals of one minute or less, and often reaching the stalling point of the motors.

Besides meeting such extreme loads, the graduated performance characteristics of the "SA" Series of electro-graphitic grades make them applicable to almost every class of commutating type equipment, both A. C. and D. C. Other National Carbon grades take care of those applications not covered by the "SA" Series.

LET US DEMONSTRATE THE SUPERIORITY OF NATIONAL CARBON BRUSHES FOR YOUR SERVICE



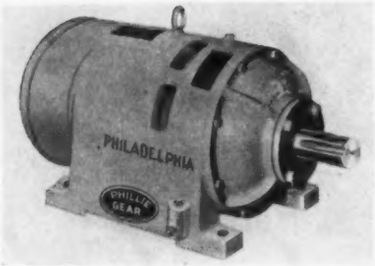


**NATIONAL CARBON COMPANY, INC.**

Carbon Sales Division, Cleveland, Ohio

Unit of Union Carbide UCC and Carbon Corporation

BRANCH SALES OFFICES: NEW YORK PITTSBURGH CHICAGO SAN FRANCISCO



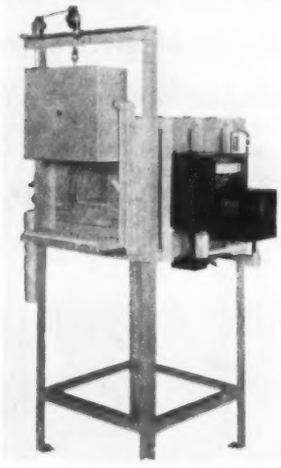

Sizes No. 405 and 444; described in bulletin MR 36. **Philadelphia Gear Works,** Philadelphia, Pa.

splash system. Vertical types are equipped with a force-feed system. A built-in plunger type pump is driven from the vertical shaft and insures an adequate supply of oil to the top bearings as well as in the lower casing.

•

## Muffle Furnace

High-temperature muffle furnaces capable of operating at temperatures of 2,300 deg. F. and which are supplied with high-temperature metallic heating elements mounted on the hearth, roof, side walls and rear of the furnace are now available. Elements are of the wound type substantially supported in grooved refractories. Refractories are reversible for forming



"Falcon" furnace; available in various chamber sizes and capacities as well as for 110, 220, 440 volts, single and three phase. **H. O. Swoboda, Inc.,** Pittsburgh, Pa.

muffle chambers, or separate muffles can be supplied if desired. All connections for the heating elements are entirely inclosed within the furnace casing at the rear. Automatic temperature control equipment consists of inclosed contactor, indicating control pyrometer, instrument potential transformer and thermocouple assembly.

•

## Mercury Switch

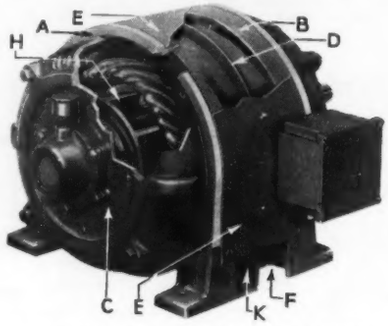
"Durakool" mercury switch; capacities 1, 5, 10, 20, 50 and 200 amp. **Buckley-Bear Laboratories, Inc.,** Elkhart, Ind.

"Repeat performance" at either rapid or slow speed is an inherent factor in this new mercury switch. "Repeat performance" permits the switch to be used in calibrating mechanisms, since the opening and closing points of the switch remain the same during the life of the unit. Accuracy is maintained, since there is no open contacts to burn away. The operating angle or the angular movement between the point of opening and the point of closure is 4 deg. A vapor-filled envelope is employed to assist in decreasing operating angle of the switch and to dissipate the heat caused by the arc. These switches are used in automatic, electrically controlled machine tools and electrically operated hydraulic equipment to eliminate mechanical parts as well as intermediate relays and contactors.

•

## Splash-Proof Motor

Unique design is claimed for this splash-proof motor, in which all external dimensions, applying to both stator frames and end plates, are identical with open type motors of the same rating. Standard electrical types are available in splash-proof frames. Standard inclosed end plates make special mechanical designs interchangeable.




"Red Band type R" splash-proof motor. **Howell Electric Motors Co.,** Howell, Mich.

Low operating temperatures and full heat radiations are provided by special design and special fan of large capacity. Air circulates over the entire stator core and all coils. Between stator (A and B) and shell (E) an encircling partition (D) is placed. Fan (H), at one end of the rotor, sucks air through the rotor. Partition (D) causes aid to feed in through intake (F) at bottom of motor; it exhausts over the left-hand half of the stator and out through outlet vent (K).

•

## Pilot Switch

For operating electric counters, for mechanical control of motor circuits and for signaling operations, this pilot switch operates on $\frac{1}{2}$-oz. pressure. Phosphor bronze spring, coin silver contacts and bronze shaft

Type ES-9; dimensions 1¼x1¼x¾ in.; rated ½ amp. a.c. or ¼ amp. d.c. **Production Instrument Co.,** Chicago, Ill.

bearings are featured in its construction. The pilot switch can be furnished for a variety of uses, it may be operated right or left hand, either open or closed circuit, with reciprocal or rotary motion, and with any position of the lever arm. Make-and-break positions may be very accurately adjusted.

# ENGINEERING DATA FROM MANUFACTURERS

**Bulletins and catalogs now available to engineers by manufacturers and associations**

RURAL CONSTRUCTION MATERIAL — Under this title the Joslyn Manufacturing & Supply Company, Chicago, brings together the particular items of pole and service fittings that are best adapted for rural lines. Methods of installation of the numerous devices are shown clearly. Some 125 items are listed.

REFRACTORIES—Information about refractory cements, refractories, heat-treating and other furnaces, as well as tabular data on the weights and measures of fire brick, is given in the Standard Handbook of Refractories, a 48-page manual issued by Standard Fuel Engineering Company, Detroit. Various methods of applying high-temperature cements are illustrated.

SILENT CHAIN DRIVES—A new book, No. 1725, 32 pages, with 30 illustrations, has been published by Link-Belt Company, Indianapolis, on "Silverstreak" silent chain drives. Complete details are tabulated for the wheels and chain constituting each drive; also horsepower and ratio tables. Simple instructions for selecting a drive from the tables are included, as are notes on design and on the installation of steel casings.

VOLTAGE REGULATORS — TRANSFORMERS — Two leaflets are announced by Allis-Chalmers Manufacturing Company, Milwaukee, Wis., one, No. 2221, on AFR-2 feeder voltage regulators for low capacity and low voltage. Detail construction is illustrated and features applying to this type of regulator are listed. The second is engineering leaflet No. 2220, on the performance of high-voltage power transformers under impulse conditions.

UNITS OF WEIGHT AND MEASURE — Department of Commerce, National Bureau of Standards, miscellaneous publication M 121, has recently been made available. It presents U. S. customary and metric units of weights and measures, definitions and tables of equivalents. Very complete and exact tables of equivalents are presented. Copies may be obtained from the Superintendent of Documents, Washington, D. C., at 15 cents each.

LIGHTNING ARRESTER STANDARDS — American Standards for Lightning Arresters approved by the American Standards Association, January, 30, 1936, are published by the American Institute of Electrical Engineers, 33 West 39th Street, New York City. The bulletin is specified as A.I.E.E. No. 28. Copies are 30 cents each.

MERCURY-VAPOR LAMP fixtures for various types of interior and exterior illumination are listed in supplement section XI-A to catalog 28 of the Benjamin Electric Manufacturing Company, Des Plaines, Ill. Tables on illumination calculations applying to the various fixtures are featured, together with data on the design of combination lighting systems using mercury-vapor and incandescent lamps.

WIRING for electric ranges and water heaters, a 25-page booklet of the General Electric Company, gives specification diagrams of typical service-entrance installations together with tables of recommended wire sizes for range circuits and cord sets. Also included are wiring diagrams for typical range and water heater circuits.

# Municipal Plants

IOWA CITY, IOWA—Six of the seven members of the City Council went on record for the construction of a $917,000 municipal light plant without the help of the government should the federal court rule that P.W.A. cannot make a grant for the work. The plant, if constructed without the help of the government, will be paid for solely and only from the earnings of the plant, was the resolution of the council.

ROCKWELL CITY, IOWA—A special election will be held on June 30 to vote on whether the Iowa Public Service Company shall be granted another franchise.

PLATTSBURGH, N. Y.—District of Columbia Supreme Court has granted to the New York State Electric & Gas Company a temporary restraining order preventing Administrator Ickes of P.W.A. from allotting $520,000 to the city for the construction of a municipal generating plant and distribution system. The company maintained that it was already providing service and that the community is too small to support two competing electric systems.

BOONVILLE, N. Y.—New York Public Service Commission has appealed from an Appellate Division order which annulled a commission order directing the village to reduce the rate schedule of its power plant. The Appellate Division remitted the entire rate question to the Commission for reconsideration. A municipality, going in the power business, should be permitted to make only enough to cover operating costs and allow a reasonable reserve fund, according to the Commission. The Appellate Division held the state has no right to impose more restrictions on a publicly owned power plant than on a privately owned one. Both are entitled to a reasonable return on investment. The commission objects to using power profits for municipal projects or for tax reduction.

ALLIANCE, OHIO—City Council has passed an ordinance over Mayor Guy Allott's veto establishing lower domestic and municipal light rates over a six-year period. The Ohio Public Service Company was given 30 days in which to protest the rates to the Ohio commission. The new schedule would save domestic users $10,500 a year and would be additional to a reduction in rates placed voluntarily in effect by the company a few months ago. Mayor Allott objected to the long-term contract.

RAYMONDVILLE, TEX. — State Appellate Court in San Antonio has affirmed the decision of the lower court in which it was held that the election by taxpayers of the city which resulted in $125,000 of bonds being voted to build a municipal electric light and power plant was invalid. In the trial of the case it was testified that the election officials had issued notice that only property owners who had rendered their property valuations for taxation purposes before April 1, 1935, were eligible to take part in the election. The election was held November 14 and a number of persons living in the city were refused the privilege of voting. The decision had been rendered by the Attorney-General to election officials before the election was held and the vote carried 20 to 7 in favor of the issuance of the bonds. The case was filed in district court at Raymondville and was heard by Judge A. M. Kent, who rendered a decision holding the election invalid. The city of Raymondville appealed the case to the higher court, which upheld the decision rendered by Judge Kent.

PORTSMOUTH, VA. — City Council may

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Blue prints are a "hold-over" from a bygone day. Hard to read, hard to check, they are out of tune with modern progress. That explains the nation-wide acceptance of Bruning BLACK AND WHITE Prints . . . true black-line prints that you can make *even faster* than blue prints!

Whether you use them in the shop, in the field or in sales work, BW Prints give you worth-while advantages. Coal-black lines on white backgrounds make everything instantly clear, eliminating confusion and mistakes. White backgrounds, too, make checking easy. The simplicity and speed with which BW Prints are produced—directly from the tracing without washing or drying—saves time and money in your print room.

BW developing machines for use with your blue print machines are available in various types and sizes to meet any requirement. Investigate BW for YOUR business. Get the complete facts about this amazing black-line direct printing process.

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# WIRES GET *Arteriosclerosis* TOO!

Take it from an old E.E., that breezy, sixteen-letter medical impediment of speech for "hardening of the arteries," can be applied to *electrical* as well as human circuits.

Speaking from experience it's no joke in either case, but of the two I'd rather have "hardening of the insulation" to contend with because it's easier to correct. When you see some of that old style stuff, with insulation gone brittle and so full of cracks that it's ready to give out any minute, follow this simple remedy . . . Yank out the run and replace it with a wire that remains *permanently flexible*—ROCKBESTOS!

That may sound like a long-term assignment but the answer is in the insulation. *Asbestos* fibres are formed by exclusive processing methods into a dense felted wall of insulation, high dielectric inserts are *asbestos-sealed*, and a tough wear-resisting *asbestos* braid forms the outer covering. It's a construction you can't beat if you're looking for a wire that will remain flexible and resist heat, moisture, acids, fumes, oils, greases or fire!

Not only that, you've got over fifty different types of wires, cables and cords to select your requirements from. Each one designed for a specific purpose, and all constructed to withstand severe operating conditions. If you want samples, information, or have a wiring problem you'd like to talk over, write to Rockbestos Products Corporation, 817 Nicoll St., New Haven, Conn.

*"Also refer to Electrical World Buyer's Reference Number of December 21, 1935, Vol. II."*

Rockbestos A.V.C. Boiler Room Wire

Suitable for general lighting and control circuits exposed to heat, moisture, acids, etc.

CONSTRUCTION

1. Conductor.
2. Felted Asbestos.
3. Varnished Cambric.
4. Felted Asbestos.
5. Asbestos Braid (Lead or Armor)

Rockbestos A.V.C.

*- - - the wire with permanent insulation*

break with the Virginia Electric & Power Company and set up a municipally owned electric light and power service. Declaring that the present franchise with the power company that furnishes more than 60,000 persons with light and bus service is not valid, the council voted unanimously on May 12 to investigate the matter of cutting its tax rate to $1 by city-owned and operated utilities. The Council's committee rendered its report after six months of negotiations with the Virginia Electric & Power Company. It has recommended a thorough investigation to see if government funds would be available for carrying out the project if the split with the power company were to become permanent.

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## Green Mountain Men Record Progress

Agreements between the Vermont Electrical Association, the granges and farm bureau of the Green Mountain state furthering rural electrification were announced at the recent annual meeting of the association in Burlington under President A. W. Paterson of St. Albans. Lines are to be built on a guarantee basis of $18 per mile revenue per month, prorated among the users with a minimum individual guarantee of $2.50 per month. This guarantee will be cut in half after five years' service. As additional users come on the line the existing takers of service will enjoy reductions in the guarantee. On a typical 3-mile line with twelve customers, a representative agreement was cited as follows: four customers having 30-cow farms, guarantee $6 each per month; four with 18-cow farms, guarantee $4.50 each; four residences, guarantee $3 each. These payments will allow as much electric service as $54 will buy at prevailing rates.

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## Trade Group Honors Utility Association

Announcement was made last week that out of 1,500 eligible organizations in the nation the Rocky Mountain Electrical Association has been awarded the "Certificate of Recognition" by the American Trade Association. The award was made by U. S. Secretary of Commerce, Daniel C. Roper, during the annual meeting of the Trade Institute in Washington, D. C. The Rocky Mountain Association is the first utility association in the nation ever thus recognized.

The certificate of recognition is issued "to the trade association which, in your jury's opinion, has done the most during the past three years to formulate, promote and interpret its work to business, the public and the government." Acting with Secretary Roper as judges were Merle Thorpe, Walter Dill Scott, Thomas Watson and Arthur D. Whiteside.

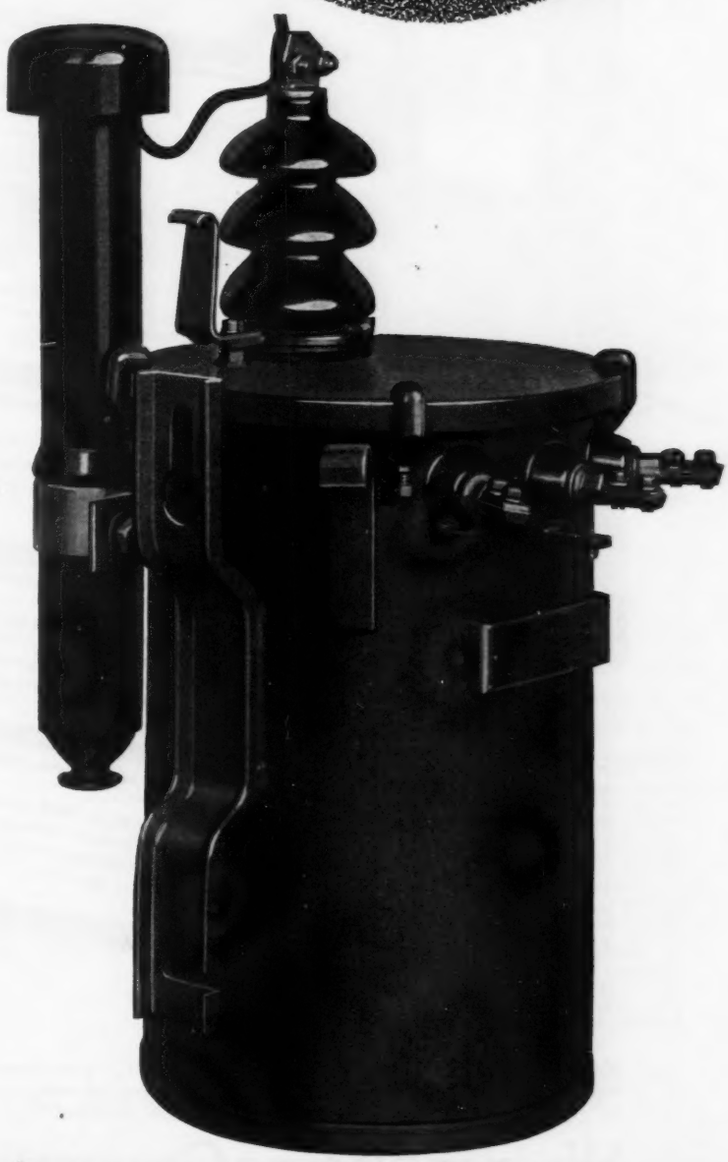
# *Now Available!*

## A NEW SURGE PROTECTED RURAL LINE TRANSFORMER

### HIGH EFFICIENCY TYPE—ALL SIZES

IN addition to Reduced Efficiency Rural Line Transformers in sizes 1 kva to 3 kva, Allis-Chalmers offers a new transformer for rural line service designed for high all day efficiency with integrally mounted surge-diverter and protective gap, and available in all N. E. M. A. ratings — 1½ to 25 kva inclusive — and for all commercial voltages.

Use of this new type transformer permits the economies of grounded neutral rural line extensions to be obtained with larger sizes of transformers than heretofore . . . with conventional efficiencies . . . with or without a surge-diverter integrally mounted.

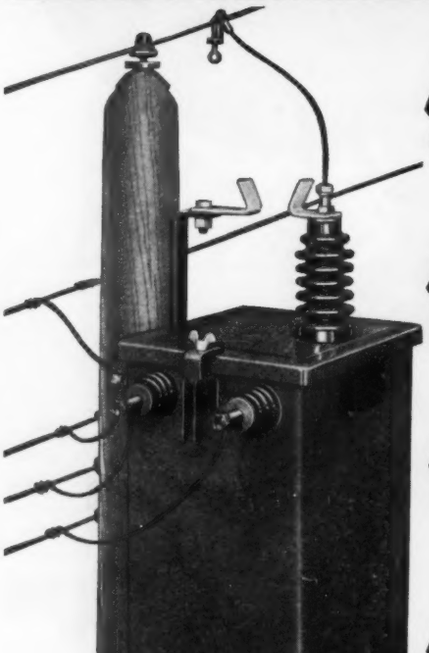


*Ask the nearest Allis-Chalmers representative for additional information concerning this new transformer.*

# ALLIS-CHALMERS

**Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, U.S.A.**

# Check These Six Points of Superiority of Wagner FARM-LINE TRANSFORMERS for Rural Service



Hanger-irons and cross-arms for support are unnecessary, as mounting brackets are provided on tank for bolting transformer directly to the pole.

Service lines can be easily connected, since the low-voltage bushings are brought out the side of the tank.

No solder is required for connecting transformers to line—solderless connectors are used for all bushing terminals and grounding lugs.

Transformer is easy to hang — all that is necessary is to raise transformer so that the slotted mounting brackets slip over thru-bolts attached to the pole.

Transformer is self-protecting against lightning as it is equipped with a co-ordinating gap that is set to flashover at a value well below the surge strength of the transformer windings.

Transformer is shipped filled with oil ready for service. This is made possible by the use of stud-type-bushings which eliminate all syphoning of oil.

Wagner Farm-Line Type HEBF distribution transformers for rural service are built for operation on a three-phase four-wire service with solidly-grounded neutral. They are designed to reduce the cost of construction and operation of rural distribution lines and to provide maximum protection against heavy surges.

They are manufactured in 1- and 3-kva sizes for 60-cycle operation in the following standard voltage classes: 2400, 4800, 6900, 7200 and 7620 volts. For ratings other than the above, consult the nearest branch office.

*Wagner Farm-Line distribution transformers have not only all these features, but many more. For further information regarding these transformers, write the nearest Wagner branch office. Descriptive literature will be sent upon request.*

**Wagner Electric Corporation**

6400 Plymouth Avenue, Saint Louis, U.S.A.

TD236-1B

*Transformers* *Motors* *Fans* *Brakes*


## Recent Rate Changes

HOUSTON LIGHTING & POWER COMPANY has announced an average reduction of 11 per cent in its rates for residential and commercial consumers of electric light and small power users, the new rates applying to both Houston and Galveston consumers. The company also granted Houston a reduction of nearly 10 per cent in its rate for street lighting, effecting a saving of $15,529 annually for the city. The new residential rate will be figured entirely on the amount of electric energy consumed, instead of partly on a per room, kilowatt-hour basis as heretofore. The light company cut its primary rate from six cents per kilowatt-hour for the first three kilowatt-hours consumed per room, to a straight 4.8 cents for the first 25 kw.-hr. The next 50 kw.-hr. will cost four cents per kilowatt-hour. The secondary rate, 4 cents per kilowatt-hour, will remain the same, but consumers now will have to use only 75 kw.-hr. per month before receiving advantage of the next lower charge of 2.5 cents per kilowatt-hour. Under the former arrangement they had to use from 112 to 130 kw.-hr., depending upon the size of the house, before the 2.5 rate would apply.

BOSTON EDISON SYSTEM has announced, subject to the scrutiny of the Massachusetts commission a downward revision for two of its rate schedules in certain blocks below the 6.5 cent per kilowatt-hour level, in order to encourage increased usage. The general rate "A" will continue at 6.5 cents for the first 500 kw.-hr., but instead of billing the second block of 1,500 kw.-hr. used in a month at 6.25 cents each, the second 500 kw.-hr. will cost the customer but 6 cents each. Minor changes will be made in the lower blocks, but in general the intention is to encourage a more rapid entrance into the second level of prices. The 5- and 3-cent rates remain applicable to larger consumptions and the $9 minimum annual charge continues. The general power rate "F" remains at 6.5 cents for the first 200 kw.-hr. per month, but drops to 5 cents for the next 800,, instead of being 6 cents each for the second block of 600 kw.-hr. per month. Under the new rate the excess above 1,000 kw.-hr. is billed at 3.5 cents each instead of at 4 cents above 800 kw.-hr. These rates apply to all energy consumed up to and including the first 100 hours' use of the demand. Above the first 100 hours' use of the demand per month the rate will be 1.5 cents per kw.-hr. for the excess above 1,000 kw.-hr. and 2.5 cents for the first 1,000 kw.-hr., the old rate being 2.5 cents for the first 1,000 kw.-hr. and 2 cents for the second 2,000 and 1.5 cents per kw.-hr. above 3,000.

WISCONSIN PUBLIC SERVICE COMMISSION heard utility representatives testify on May 14 in response to a demand that they show cause why they should not reduce wholesale rates to farmers' co-operative electric lines. The utility men declared that production of electricity, including taxes, labor and materials, is higher today than it was five years ago. L. F. Seybold, research engineer representing the Wisconsin Gas & Electric Company and the Wisconsin-Michigan Power Company, stated that they served Jefferson, Kiel, Deerfield, Elkhorn and Slinger in 1935 at a wholesale rate of 1.41 cents per kilowatt-hour, representing a cost of 1.34 cents to the utility. Grover C. Neff, president of the Wisconsin Power & Light Company, declared that rural electric service has not proved profitable, but that it has been developed by the utility as a part of its obligation to the public and with a thought to possible future profit. Orland S. Loomis, state rural electrification co-ordinator declared the R.E.A. wanted rates around 1½ cents a kilowatt-hour with a minimum

DIAMOND VULCANIZED FIBRE — A chemically hydrolyzed laminated cotton fibre insulating material.

Here is a material that meets electrical insulating and mechanical requirements in a manner not met by any other material. It is made in sheets, rods and tubes in standard sizes, providing base forms for fabricating practically any shape piece you need. It is tough as horn, lighter than aluminum, has high electrical insulating properties, and is readily machined, punched or formed.

You can probably use Diamond Vulcanized Fibre in countless ways to replace less efficient materials and so effect production economies and improve product quality and performance. Perhaps you are now using Vulcanized Fibre armature wedges, bushings, discs, ferrules, fuse tubes, handles, switch bars, washers, or other intricate insulating parts. Perhaps there are other places where you could use Diamond Vulcanized Fibre to advantage. Why not be sure.

Consult with our engineering department. They offer you the benefit of their store of knowledge and experience gained in designing thousands of parts to be made from Diamond Vulcanized Fibre. When you have an electrical or mechanical insulation problem where you think Fibre can be used to advantage write us about it. Our experts will be glad to study your problem and submit marked samples of the proper grades and forms of Fibre for your special use. Write today for a complete Diamond Vulcanized Fibre catalog.

## CONTINENTAL-DIAMOND FIBRE CO.

NEWARK, DELAWARE

CONTINENTAL DIAMOND FIBRE COMPANY

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## DISTRIBUTION TRANSFORMERS

Here is a 40-page book that will help you in the selection of distribution transformers for your requirements.

It lists data in tabular form for all standard voltage ratings and Kva. sizes, viz—accessories, taps, approximate weights, dimensions, gallons of oil, etc. In addition, it contains descriptive information and illustrations of constructional details for pole-, platform-, surge-protected-, subway-, and vault-type transformers in sizes from 1½ to 500 Kva., 240 to 73,000 volts, single or three phase, 60 or 25 cycles.

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rate of about 1 cent for large consumption. He declared that utilities have hade no reduction of wholesale rates in the last five years, although they had made retail reductions.

TENNESSEE STATE RAILROAD AND PUBLIC UTILITIES COMMISSION has taken under advisement the case against the West Tennessee Power & Light Company to show cause why electric rates should not be reduced and will render a decision later. M. L. Williams, rate engineer for the commission, testified he believed the rates could be cut without injury to the company, and predicted that any rate reductions would be offset by the increased consumption of electricity. Col. Roane Waring of Memphis, attorney for the utilities company, asked the commission to consider the company's operating reports and financial statements and the probability of competition from the co-operatively owned electric systems distributing T.V.A. power.

OHIO PUBLIC UTILITIES COMMISSION has authorized the Columbus, Delaware & Marion Electric Company, the Morrow Public Service Company and the Mt. Gilead Water, Light, Heat & Power Company to reduce their electric rates in Marion and seven other villages in Marion, Delaware and Morrow counties, effective July 1.

ALABAMA POWER COMPANY'S new rate for municipal street lighting and white-way service has been approved by the Alabama Public Service Commission.

KNOXVILLE POWER COMPANY'S new schedule of lower residential electric rates for Alcoa, Tenn., and Blount County outside of Maryville, Tenn., has been approved by the Railroad and Public Utilities Commission.

BROOKVILLE-LEWISBURG LIGHTING COMPANY has voluntarily reduced its rates on energy on the first block or unit in any one month, following approval by the Ohio Public Utilities Commission. The new rate is 7 cents for the first 40 kw.-hr. for domestic users, a reduction of 1 cent, with commercial rates being reduced to 7 cents from 8 cents for the first 50 kw.-hr.

FORT DODGE GAS & ELECTRIC COMPANY has reduced its electric rates from 7 to 6½ cents for the first 50 kw.-hr. in both the residential and commercial schedules and has also provided a substantial cut in power rates. The ordinance, providing for the cut, was passed by the City Council following several months' negotiation between city officials and utility executives. T. C. Roderick, general manager of the utility, stated the new rates will benefit all users of electricity, residential, commercial and power. The reduction will mean a total saving of $20,000 a year.

•

## 25 Years of Progress In British Power Plants

In a country where almost the entire energy output is generated from coal, the last 25 years have seen tremendous strides in efficiency, the British Fuel Research Board reports. Britain's 2,500,000,000 units of electricity in 1910 required 4,500,000 tons of coal and, on that basis, the 1934 production of 16,100,000,000 units would have required 29,000,000 tons of coal, whereas 11,400,000 tons actually were required.

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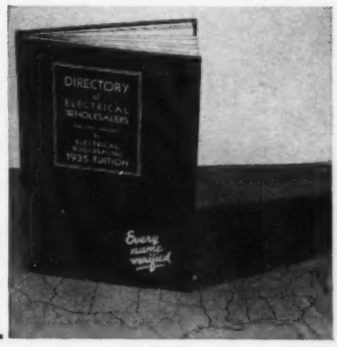


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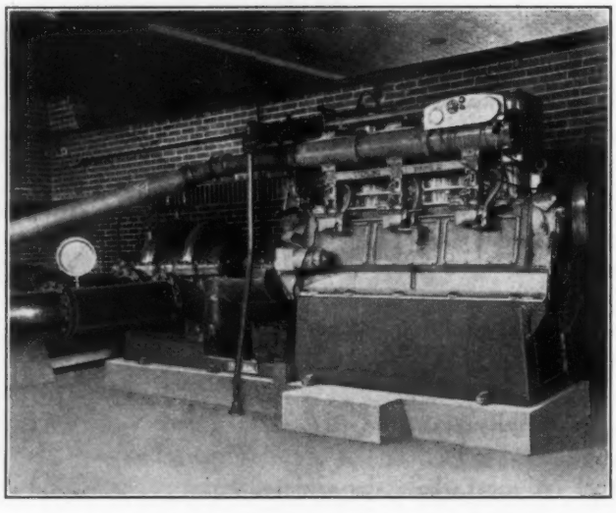

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# Electrical Market in Holland Limited

Electrical energy output in the Netherlands increased annually even during the depression period, from 1,720,000,000 kw.-hr. in 1929 to 2,233,000,000 kw.-hr. in 1933. Installed generator capacity increased during the same period from 850,808 kw. to 1,223,035 kw.

This information, with numerous other statistics, is given in No. 19 of the series being published under the title "World Power Manual and Electrical Exporters' Handbook" by the Electrical Division of the Bureau of Foreign and Domestic Commerce. Other data are abstracted in the accompanying table. The figures for length of underground and overhead high-tension lines are quoted as given but they seem to have been interchanged.

**Electrical Industry in Netherlands**

| | 1929 | 1931 | 1932 |
|---|---|---|---|
| Installed kw..... | 850,808 | 1,130,409 | 1,150,860 |
| High tension lines. km.: | | | |
| Underground*. | 13,437 | 15,519 | 16,074 |
| Overhead*..... | 1,237 | 1,343 | 1,317 |
| Consumers..... | 1,300,767 | 1,505,195 | 1,570,680† |
| Employees..... | ..... | 10,437 | 10,281 |
| Generated kw. hr. (1,000)..... | 1,720,000 | 2,115,000 | 2,190,000 |
| Consumed kw. hr. (1,000)..... | 1,462,718 | 1,807,259 | 1,854,767 |

*See text. †1,570,680 in 1934.

That the country has a very considerable amount of cable is evident from the map which was published in the ELECTRICAL WORLD of December 22, 1934, page 1151.

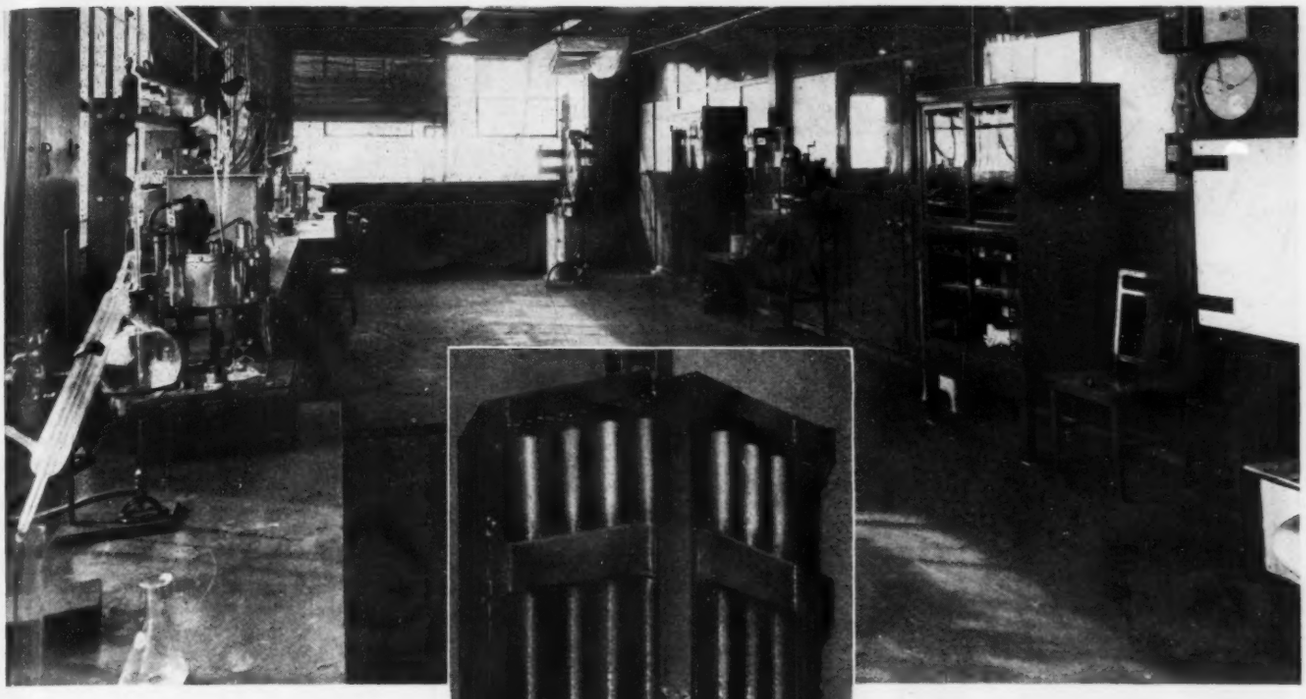
The report also includes a discussion of the market for electrical equipment, of which the immediate outlook is stated to be "not particularly encouraging" because of continued unfavorable economic conditions and the efforts that are being made to reserve a larger share of the greatly reduced volume of domestic business for Netherland manufacturers.

Statistics are given also as to the type of service in various localities. The frequency of alternating current throughout the country is consistently 50 cycles. The predominant service voltage is 220, with the 127/220-volt combination in second place and individual instances of 120, 125 and 150 volts.

•

## Detroit Edison Sets Record for 1936 Output

A new high mark for this year was established by the Detroit Edison Company when industrial power sales for the week ended May 9 totaled 27,808,000 kw.-hr., closely approaching the all-time high of 28,332,000 kw.-hr. established December 15, 1935.



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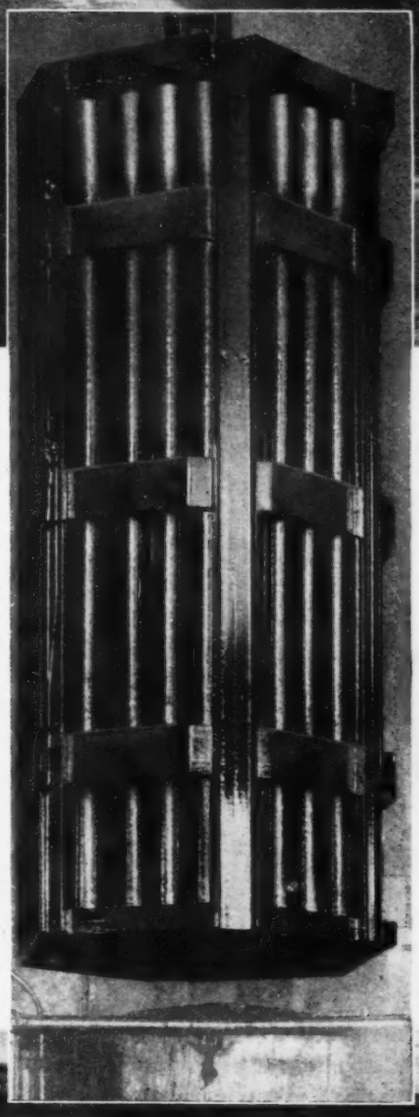

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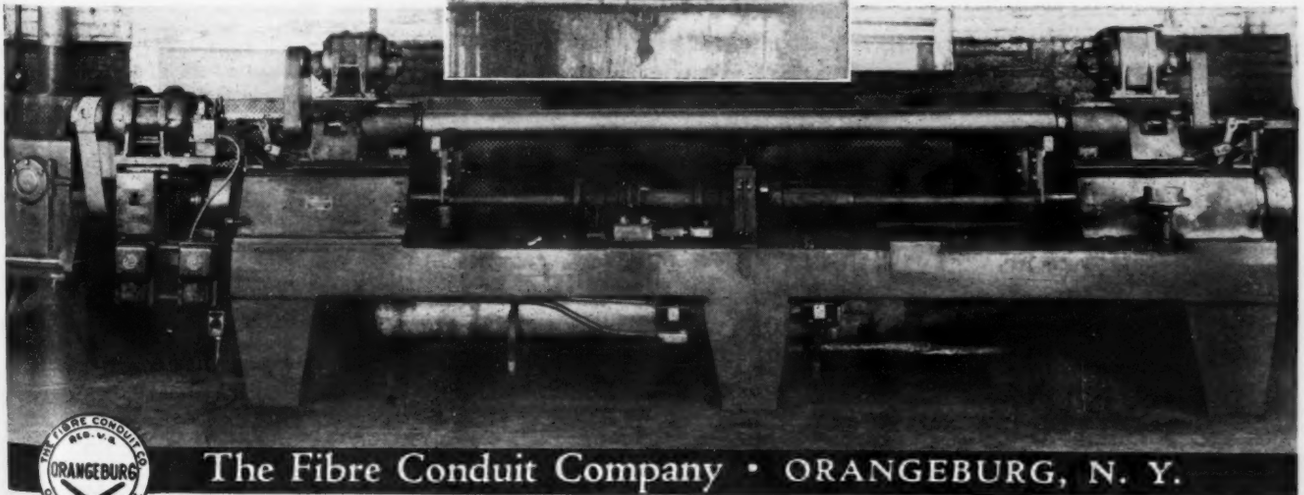

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## SALES OPPORTUNITIES IN NEW CONSTRUCTION

ANGOLA, IND.—Consumers Power Company, Jackson, Mich., has arranged for purchase of lines and operating facilities of Hillsdale County Electric Company, Angola, situated primarily in Cambria and Montgomery Counties, Mich., and will add properties to its system. Extensions and improvements will be made, including transmission lines for connection with acquired system for power supply, power substation and switching station facilities. Purchased company heretofore has been a unit of Northern Indiana Public Service Company, securing power at state boundary from that source.

LEEDS, ALA.—Universal Atlas Cement Company, 208 South La Salle Street, Chicago, Ill., plans electrification of cement mill at Leeds, in connection with expansion and modernization of plant, and will install heavy duty motors and controls, transformers and accessories, electric power drives, conveyors and other equipment. Company will also carry out similar improvement program at local quarry properties, with installation of heavy duty electric shovels and other machinery, loaders, etc. Entire project will cost close to $1,500,000. Company is a subsidiary of United States Steel Corporation, New York.

FALLON, NEV.—Fallon Irrigation District is considering plans for power supply for district and has engaged George B. Scheer, 2967 Piedmont Avenue, Berkeley, Calif., electrical engineer, to make surveys and comparisons of cost. Projects under advisement include new Diesel engine-generating station at Lahontan, to cost about $125,000, in conjunction with hydroelectric generating plant at terminus of Truckee Canal, latter to be used during certain seasons when water is available; also, proposition to purchase from outside sources, with construction of main power substation and distribution facilities.

WASHINGTON, D. C.—Division of Purchases and Sales, Department of Commerce, receives bids until June 9 for 30,000 feet of plain electric cable and 30,000 feet armored electric cable (Proposal 27963).

ORANGE, N. J.—Monroe Calculating Machine Company, 555 Mitchell Street, plans installation of motors and controls, conveyors and other equipment in new addition to calculating machine manufacturing plant. Cost about $150,000.

TECUMSEH, NEB.—Eastern Nebraska Public Power District, A. P. Fitzsimmons, Tecumseh, president, plans transmission and distributing lines in parts of Johnson, Pawnee, Richardson and neighboring counties for rural electrification, totaling about 320 miles, with power substation and service facilities. Fund of $365,000 has been secured through Federal aid. Proposed to secure power supply from hydroelectric power station of Loup River Public Power District, Columbus, Neb., now in course of construction.

GEORGETOWN, TEX.—Plans extensions and improvements in city-owned electric power plant, with installation of new generating equipment and auxiliaries for increase in present capacity. Estimates of cost are being made by Burns & McDonnell Engineering Company, 107 West Linwood Boulevard, Kansas City, Mo., consulting engineer.

WASHINGTON, D. C.—Bureau of Supplies and Accounts, Navy Department, Washington, receives bids until June 9 for 290,000 feet portable cable, 68,000 feet general interior communication cable, 12,000 feet flameproof cable, and 3,000 feet lighting and power cable for Brooklyn, N. Y., Mare Island, Calif., and Puget Sound, Wash., Navy Yards (Schedule 8004). Also, until

June 12 for 11,000 feet electric cable for Norfolk, Va., Navy Yard (Schedule 8038).

YOUNGSTOWN, OHIO — Cold Metal Process Company plans installation of heavy duty motors and controls, regulators, conveyors, electric hoists, electric cranes and other equipment in former local mill of Sharon Steel Corporation, leased for new plant, to be modernized and equipped at early date for heavy machinery production. Cost about $200,000.

TACOMA, WASH.—St. Regis Kraft Company plans installation of motors and controls, conveyors, machine drives, electric hoists and other equipment in connection with expansion and modernization program at local pulp mill, including construction of new units. Cost about $1,000,000. Hardy S. Ferguson & Company, 200 Fifth Avenue, New York, N. Y., are consulting engineers.

CHARLESTON, S. C.—Bureau of Yards and Docks, Navy Department, Washington, D. C., receives bids until June 17 for switchboard and auxiliary equipment for Charleston Navy Yard, including electrically-operated oil circuit breakers in steel compartments and remote controlled from operating panels, with complete accessories, cables, conduits, instruments, etc. (Specifications 8222).

LOCKHART, TEX.—Is considering new city-owned electric power plant and electrical distribution system. Surveys and estimates of cost are being made by Burns & McDonnell Engineering Company, 107 West Linwood Boulevard, Kansas City, Mo., consulting engineer. Proposed to arrange financing through Federal aid.

KNOXVILLE, TENN.—Tennessee Valley Authority, Knoxville, Director of Purchases, receives bids until June 26 for construction of transmission line from Wheeler Dam hydroelectric generating plant to Guntersville Dam power plant, Ala., about 65 miles, as per plans and specifications on file.

PORT ST. JOE, FLA.—St. Joe Paper Company, recently organized, care of Edward Ball, Barnett Building, Jacksonville, Fla., plans installation of motors and controls, power substation equipment, regulators, machine drives, electric hoists, conveyors and other equipment in new multi-unit kraft pulp and paper mill on waterfront at Port St. Joe. A power house will be built. Entire project will cost close to $6,000,000. Mead Corporation, Chillicothe, Ohio, George H. Mead, president, is interested in project.

SPOKANE, WASH.—Has approved plans for new city-owned power plant for power supply for waterworks station and other municipal service, to be known as Upriver power station, and will proceed with project at once. Cost about $250,000, including transmission lines.

JERSEY CITY, N. J.—American Can Company, 230 Park Avenue, New York, N. Y., plans installation of motors and controls, conveyors and other power equipment in new seven-story addition to branch plant on Tonnele Avenue, Jersey City. Cost about $250,000.

DENVER, COLO.—Bureau of Reclamation, Denver, receives bids until June 11 for one steel tower supporting structure and three pedestal supporting structures for lightning arresters, one steel supporting structure for transfer disconnecting switches and one steel supporting structure for single disconnecting switches, one steel bus structure and three steel pedestals for lightning arresters at Boulder power plant, Boulder Canyon Project, Arizona-California-Nevada (Specifications 798-B).

BROOKLYN, N. Y.—Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, receives bids until June 9 for 700,000 feet of wire, 21,000 feet of cable, and 21 reels (Circular 241).


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